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THE CALIFORNIA MANNA.¹

BY JOHN URI LLOYD, PH.M.

MENTIONED BY FATHER PICOLO. (*With a summary.*)

Query by Prof. Flückiger:

"What was the manna mentioned by one Father Picolo in California and alluded to by Proust, in *Ann. d. Chim.*, 57 (1806), p. 145?"
Answer by John Uri Lloyd.

DEAR PROF. FLÜCKIGER:—I find, on reference to the paper cited, that the statement is as follows:

Proust. *Ann. d. Chim.*, 57, p. 145. On the Sugar of the Grape.

The manna seems to abound in America, according to the reports of travellers. Herera says: "It falls in the season in the quantity of a dew, which congeals like sugar, and which is so wholesome that it is named Manna. Father Picolo, one of the first

¹ When Prof. Flückiger visited America (July, 1894) he hoped to obtain historical data that would enable him to give the records of several interesting American productions. In this he failed, and he then associated in his behalf the services of the author of this paper. After much of the work had been done, the death of Prof. Flückiger interrupted the investigation.

These papers (some of them) passed into possession of Prof. Ed. Schaer, of the Strasburg University, who translated into German the accompanying work by Professor Lloyd on American Manna, for the pages of the *Berichte der deutschen pharmaceutischen Gesellschaft*.

We present herein, with the knowledge and consent of Prof. Schaer and the author, the original paper on American Manna.—Editor AM. JOUR. PHARM.

spiritual conquerors of California, assures us that it exudes in considerable amounts from the shrubs (*arbrisseaux*) in April, May and June."

It will be shown hereafter that this is not a literal abstract from the original source, where the word *roseaux* is used instead of the word *arbrisseaux*.

In tracing this subject, first the biography of Father Picolo presents itself as follows:

BIOGRAPHY OF FRANÇOIS MARIE PICOLO.²

Abstracted from Bibliothèque des Écrivains de la Compagnie de Jésus, Liège A. Lyon, 1872, p. 1957.

"Picolo, François Marie, a Sicilian Jesuit, was born in Palermo, March 24, 1654, entered the Society of Jesus in 1673, and made the four vows in Mexico in 1689. He founded the Mission of Jesus of Carichic, where he resided for fourteen years, and afterwards united with Father Jean de Salvatierra in order to open the missions in California.

"After a stay of forty years with the missions, he received the reward of his toil on February 22, 1729."

His writings, as far as known to me,³ are contained in the following communication:

"Memoir, with regard to the conditions of the missions lately established in California, by the Fathers of the Society of Jesus; presented to the Royal Council of Guadalajara, in Mexico, February 10, 1702, by Father François Marie Picolo, of the same society, and one of the original founders of this Mission."

This memoir of F. M. Picolo is reprinted literally in *W. I. Kip's Historical Scenes from the old Jesuit Missions*, New York, 1875, which is an abstract of American topics from the following work:

"*Lettres Édifiantes et curieuses, écrites des Missions Étrangères, in 47 volumes, containing the letters of the Jesuit missionaries from about 1650 to 1750,*" this collection being purchased by W. I. Kip from the library of the Bishop of Durham.

Speaking in Chapter II, Missions in Lower California, 1702, he states, p. 57, in the months of April, May and June, a kind of manna

² Thanks are extended St. Xavier's College, Cincinnati, for library courtesies, thus enabling this biography to be presented.

³ J. U. L.

falls with the dew, which congeals and hardens on the leaves of the reeds⁴ (roseaux) from which it is gathered. I have tasted it. It is a little darker than sugar, but has all its sweetness."

Endeavoring to identify Father Picolo's manna, the following reference to manna-like bodies (false mannas) was noted in the U. S. Dispensatory, 17th Ed., Philadelphia, 1894, p. 850, which, however, are not the same manna as that of Picolo.

"*American False Manna.* A substance resembling manna, of a sweet, slightly bitter, and terebinthinate taste, and actively purgative, exudes from incisions in *Pinus Lambertiana* of Oregon, and is used by the natives." (Nar. of U. S. Expl. Exp., v. 232.)

"M. Berthelot has abstracted from this product a peculiar saccharine principle which he calls 'pinite.'" (See A. J. P., vol. 28, p. 157.)

The strongly cathartic properties of this manna of the pinus and its resemblance to manna are emphasized in the following description of this substance:

I. Wilkes, *Narrative of the U. S. Exploring Exped.*, Philadelphia, 1850, Vol. 5.

P. 232. Speaking of the *Pinus Lambertiana*, which they found frequently when crossing the Umpqua Mountains in Southern Oregon. "Some of the sugar produced by this tree was obtained; it is of a sweet taste, with a slightly bitter and piny flavor; it resembles manna, and is obtained by the Indians by burning a cavity in the tree, whence it exudes. It is gathered in large quantities.

"This sugar is a powerful cathartic, and affected all the party who partook of it; yet it is said that it is used as a substitute for sugar among the trappers and hunters."

II. John S. Newberry, botanist in charge of the U. S. Pacific R. R. Surveys, California and Oregon. *Botanical Report*, 1855, p. 44. *On the Pinus Lambertiana, the Sugar Pine.*

"The resin of the sugar pine is less abundant than that of the *P. ponderosa*; is white or transparent like that of *P. strobus*.

"That which exudes from partially burnt trees, for the most part, loses its terebinthine taste and smell, and acquires a sweetness nearly equal to that of sugar.

"This sugar gives the tree its name, and is sometimes used for

⁴ *Roseaux*, in the original *Lettres édifiantes*, etc., Tome V, p. 264, Kip's translation, is literal, as we have verified from the original letter.—J. U. L.

sweetening food. It has, however, decided cathartic properties, and is oftener used by the frontier men as a medicine than a condiment.

"Its resemblance in taste, appearance and properties to manna strikes one instantly; and but for a slight terebinthine flavor, it might be substituted for that drug without the knowledge of the druggist or physician, its physical and medical properties are so very like."

It is not possible that Father Picolo refers to the sugar from these trees, as he failed to record any cathartic properties as an attribute of his sugar; furthermore, the manner which he describes of collecting the sugar hardly conforms to the description just given as to the manner of collecting it from these trees. It is most probable, according to his brief statement on the subject (for he mentions it as occurring "on the leaves of the reeds"), that high trees carrying sugar in their sap are out of question, although such sugar trees were not unlikely to have been met by him. For example, also, (*white maple*, *Acer macrophyllum*, see appended list of references, No. 8).

Only reed grasses are likely to come into consideration with the manna of Picolo, and of these we have recorded as follows:

(1) *Manna grass*, *Glyceria*. This seems to be out of the question, as text-books on botany (Gray, etc.) state that the name, denoting sweet, is given in allusion to the taste of the grain.

(2) *Phragmites communis*, *Trin.* Described by *U. S. Geological Exploration of the 40th parallel*. C. King, 5th vol. Botany. S. Watson, p. 390.

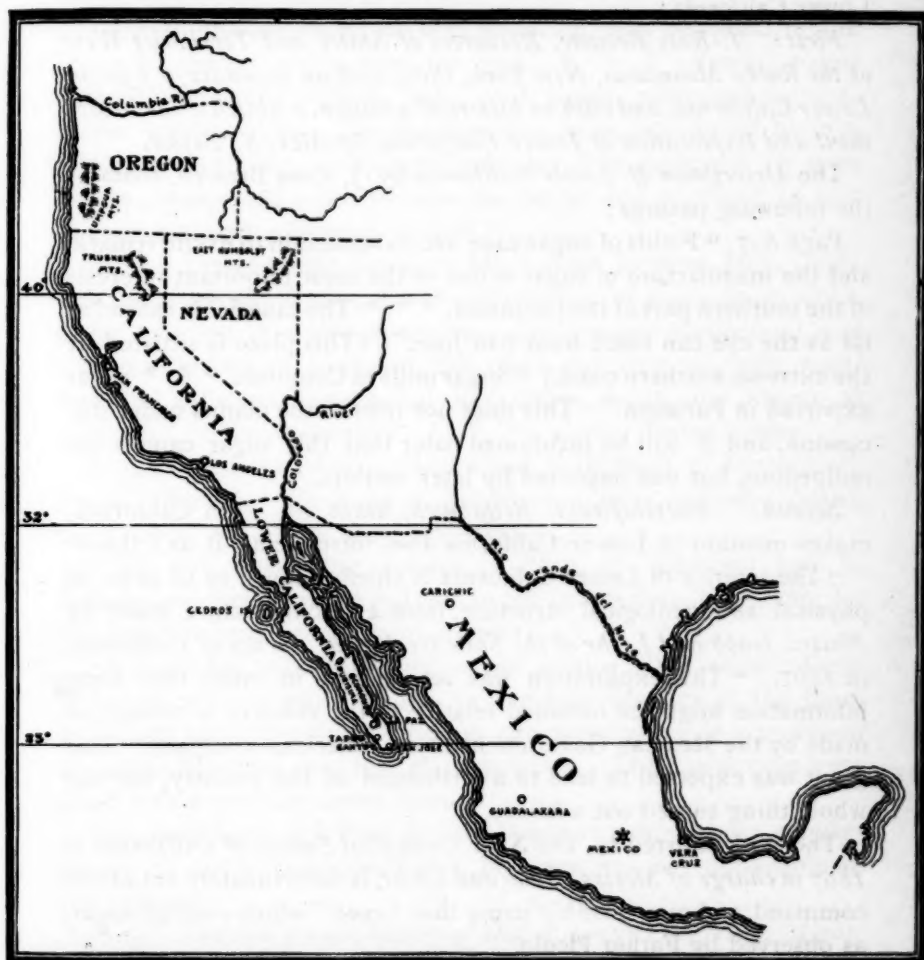
"Found from Florida to Canada and westward to the Pacific. On the banks of fresh-water streams and springs from the Truskee to the East Humboldt Mountains, Nevada, 4-6000 feet altitude. Sugar is said by Durand and Hilgard⁵ to be extracted from the stalks of this grass by the Indians, but the scanty juice is not at all saccharine.

"A sweet secretion, however, is sometimes formed upon it in considerable quantity by aphides, as well as upon the leaves of *cottonwood* and *other trees*, and is collected by both the Utes and the Mormons."

If this is correct [there is no higher authority to be found than

⁵ *Pacific R. R. Surveys, Bot. Rep.* By Durand and Hilgard, Washington, D. C., 1855, p. 15.

Sereno Watson], the "manna" observed to form on these plants is the secretion of an insect and *not* an exudation from the plant. *Phragmites communis*, thus far, comes nearest the plant described by Father Picolo.



All the plants cited before were found to occur in locations altogether different from the locality where Father Picolo made his observations, which does not, however, preclude them from his territory.

(See accompanying map.)

Father Picolo's range of observation never extended north of Lower California, and, on the other hand, the information we have of this California (which is really a part of Mexico) is rather scant.

The following publications present two sources of information on Lower California :

First: J. Ross Browne, Resources of States and Territories West of the Rocky Mountains, New York, 1869, with an appendix, p. 630, on Lower California, and with an historical addition, a Sketch of the Settlement and Exploration of Lower California, by Alex. S. Taylor.

The *Description of Lower California* by J. Ross Browne, contains the following passage :

Page 637, "Fields of sugar cane are too common to excite remark, and the manufacture of sugar is one of the most important interests of the southern part of the peninsula. * * * The cane fields extend as far as the eye can reach from San José." (This place is situated at the extreme southern coast.) "Sugar mills in Comondu * * * sugar exported in Purisima." This does not refer to the manna under discussion, and it will be mentioned later that this sugar cane is not indigenous, but was imported by later settlers.

Second: Encyclopædia Britannica, ninth ed. On California ; makes mention of Lower California also, introducing it as follows :

"The interior of Lower California is chiefly known to us as to its physical and geological structure, from a reconnoissance made by Messrs. Gabb and Loehr of the State Geological Survey of California, in 1867. "This exploration was set on foot in order that some information might be obtained relative to the value of a concession made by the Mexican Government to an American company. This grant was expected to lead to a settlement of the country, but the whole thing turned out a failure."

The work referred to, *The State Geological Survey of California in 1867 in charge of Messrs. Gabb and Loehr*, is unfortunately not at our command, and may possibly name that "reed" which yielded sugar, as observed by Father Picolo.

However, the first-named book, by J. Ross Browne, in its second part, *A Sketch of the Settlement and Exploration of Lower California*, by Alex. S. Taylor, that appeared in 1869, makes mention of the exploration of Lower California that had taken place in 1867 by Messrs. Gabb and Loehr, under the direction of Mr. J. Ross Browne, the results of which, however, were not then published.

Mr. J. Ross Browne, however, gives a general outline of this exploration, based on detailed letters he received from Mr. Gabb while on his exploring tour.

P. 66, a description of vegetation in Lower California is given, which may be condensed as follows:

"*Agaves* (century plant) are also abundant, may be useful in the future to extract spirits from the root. * * * *Acacias*, palms with edible fruits, coniferæ, oaks, wild plums, cottonwoods, sycamores, willows, elder. The Arabian date palm, introduced by missionaries, is thriving. *The sugar cane has been cultivated for more than a century*, and yields a sugar as strong and as sweet as that of Peru, and very abundant in juice."

P. 82. Letter of Mr. Gabb to Mr. J. Ross Browne, May, 1867: "At Santiago, there are extensive plantations of sugar cane, and a sugar mill was in active operation. The process throughout is of the most primitive kind, but the result is a very palatable sugar moulded into cakes somewhat like maple sugar, and known as *panoche*." "Sugar industry * * * also at Todos Santos."

P. 143 of J. Ross Browne, Sketch and Settlement of Lower California. *Report of Dr. John A. Veatch on Carros or Cedros Island*, p. 152, *Soil and Productions*, pine trees.

"The two interesting species of *Rhus* (*R. Lentiana* and *R. Veatchiana*) form marked features in the island flora, the former for the delicious acid exudation of its fruit." * * *

"A beautiful, yellow-flowered agave or aloe plant, about 12 feet in height, with a stem from 4 to 6 inches diameter at the base, branching and spreading at the top and terminating in a profusion of golden blossoms, was tolerably abundant. The flower cups were filled with a fragrant, sweet liquor."

The same book of J. Ross Browne points to a *third source of information on Lower California*; this, however, was not obtainable in the original.

P. 155, *Extracts from a history of Old or Lower California. A posthumous work written originally in Spanish by Padre Franc. Jav. Clavijero, of the Society of Jesus. Translated into Italian, Venice, 1789, and back again into Spanish by Nicolas Garcia de San Vicente (Juan R. Navarro, editor), 1852, was translated into ENGLISH BY A. G. RANDALL, Secretary and Translator of the Lower California Company's Exploring Expedition, San Francisco, May, 1867.*

P. 164 of J. Ross Browne's Book, *loc. cit.*, says, as bearing on our subject:

"In some parts there grows, near running streams, reed grass, of the thickness of the little finger.

"THIS LITTLE REED IS THE ONLY PLANT IN CALIFORNIA IN WHICH MANNA IS FOUND. At the present time there are large growths of this imported from abroad."

Biography of Francisco Xavier Clavijero. Taken from Bibliothèque de la Compagnie de Jésus. Tome II, Bruxelles and Paris, 1891, p. 1210.

Francisco Xavier Clavijero, born in Vera Cruz, on the 9th of September, 1731. Was received in the province of Mexico, February 13th, 1748. He taught rhetoric in Mexico, philosophy at Valladolid and at Guadalajara in New Spain. He was exiled and deported to Italy, and died at Bologna April 2, 1787.

Historia de la Antigua a Baya California. Obra posthuma del padre Francisco Javier Clavijero de la compañía de Jesus.

[NOTE.—Some time after this paper was placed in the hands of Professor Flückiger, the following information was found in the Lloyd Library, and a copy at once forwarded to Prof. Ed. Schaer, Strasburg, for the purpose of supplementing the present paper.

From the U. S. Agricultural Report for 1870, *Food Products of the North American Indians*, p. 423, "Bent grass (*Arundo phragmites*)" (which is a synonym for *Phragmites communis*, Trin.).

"This species of reed, which grows abundantly around St. Thomas, in southern Utah, during the summer months, produces a kind of white, sweet gum. The Utah Indians cut down the reeds and lay them in piles on blankets or hides, and let them remain for a short time to wilt, when the bundles are beaten with rods to release the gum. The small particles so detached are pressed into balls to be eaten at pleasure. It is a sweet, manna-like substance."

In the returned manuscript we find a foot-note by Professor Schaer, giving the substance of the foregoing quotation, which Professor Flückiger had gathered from the same authority while he was in Brooklyn.]

SUMMARY.

Sugar and two kinds of "manna" are described in Western literature.

1st, *Sugar*. Sugar was derived from the sugar cane, which wa

introduced into Lower California at least one hundred years ago. This was not "manna."

2d, *Father Picolo's Manna*. Father Picolo observed a saccharine deposit on a species of grass that he called reeds (roseaux) and not shrubs (arbrisseaux) as Proust recorded the word. Of the plants likely to have yielded this manna, the *reed grasses* only are to be considered. Of the reed grasses, *Phragmites communis* undoubtedly answers all the conditions that are cited by Father Picolo, and in my mind this plant is the origin of Picolo's Manna. This manna is (or was recently) still collected by the Indians.

3d, *Manna of the Pinus*. This is yielded by *Pinus Lambertiana* of Oregon, and is cathartic as well as sweet, but no evidence exists to indicate that Picolo had any knowledge of its existence.

Finally, I would decide that without question Father Picolo described, as he saw it, the saccharine deposit on *Phragmites communis*, which, according to Watson, is caused by aphides.

REFERENCES ON THE SUBJECT OF FATHER PICOLO'S MANNA.

(1) PROUST, *Ann. d. Chimie*, 57 (1806), p. 145, mentioning Father Picolo and his manna; this occurring on "arbrisseaux" shrubs.

(2) *Bibliothèque des Ecrivains de la Compagnie de Jésus*, Liège & Lyon, 1872, p. 1957. Biography of Father Picolo, and mentioning his "Mémorial."

(3) *Lettres édifiantes et curieuses, écrites des Missions étrangères*, in 47 volumes, containing the letters of the Jesuit missionaries from about 1650-1750. Translated from the Spanish, Vol. V, p. 264. Containing the memoir of Father Picolo, mentioned under 2 in French, manna occurring on "roseaux" reeds.

(4) W. I. KIP, *Historical Scenes from the old Jesuit Missions*, New York, 1875, p. 50. Containing the "memoir" of Father Picolo, literally translated into English.

(5) *U. S. Dispensatory*, seventeenth edition, Philadelphia, 1894, p. 850. On American False Manna. From *Pinus Lambertiana*, Sugar Pine. Points to Reference No. 6.

(6) WILKES, *Narrative of the U. S. Exploring Expedition*, Philadelphia, 1850, Vol. V, p. 232. On *Pinus Lambertiana*. The sugar has strongly cathartic properties.

(7) JOHN S. NEWBERRY, botanist in charge of the U. S. Pacific R. R. Surveys in California and Oregon, 1855. *Botanical Report*, p. 42. Describing *Pinus Lambertiana* and corroborating statement in Reference No. 6.

(8) J. G. COOPER, botanist in charge of the U. S. Pacific R. R. Survey Route near the 47th and 48th parallels, explored by I. I. Stevens, 1853-55. *Botanical Report*, No. 1, p. 28. Mentions *White Maple*, *Acer macrophyllum*, as containing sugar in its sap.

(9) ASA GRAY and others. *Botany*. Manna grass, sweet principle is contained in the grain.

(10) SERENO WATSON, botanist in charge of U. S. Geological Exploration of

the 40th parallel, under C. King, 5th Vol. *Botany*, p. 390. On *Phragmites communis*. Reed-sap not saccharine. Aphides cause sweet secretions on its leaves and those of cottonwood and other trees.

(11) DURAND AND HILGARD, Pacific R. R. Survey. *Botanical Report*, Washington, D. C., 1855, p. 15. The Indians are said (by D. and H.) to extract sugar from *Phragmites communis*. This seems to be contrary to the statement in Reference 10.

(12) J. ROSS BROWNE. *Resources of States and Territories west of the Rocky Mountains*, New York, 1869, (a) with an appendix, p. 630, on Lower California, and with an historical addition, (b) A sketch of the settlement and exploration of Lower California, by Alex. S. Taylor. In 12 (a) it is mentioned that sugar cane abounds in Lower California; 12 (b) contains further references.

(13) *Encyclopædia Britannica*, 9th ed. On California, also on Lower California, points to Reference No. 14.

(14) GABB AND LOEHR, with the State Geological Survey of California in 1867. The original was not accessible. A brief excerpt is contained in Reference 12 (b), p. 66.

(15) Report of JOHN A. VEATCH, *On Carros or Cedros Island*. Original not accessible. Brief excerpt is to be found in Reference 12 (b), p. 152. Mentions an "agave," which contains a sweet liquid in its flowering cups.

(16) *Extracts from a History of Old or Lower California*. A posthumous work, written originally in Spanish by Padre Franc. Javier Clavijero, of the Society of Jesus. Translated into Italian, Venice, 1789, and back again into Spanish by Nicolas Garcia, de San Vicente (Juan R. Navarro, editor), 1852. Was translated into English by A. G. Randall, Secretary and Translator of the Lower California Company's Exploring Expedition, San Francisco, May, 1867. Original not accessible. An abstract to be found in 12 (b), p. 164. It states that there is a reed growing in Lower California near running streams that yields manna.

CORROSIVE SUBLIMATE IN CALOMEL.¹

BY LYMAN F. KEBLER.

The 1890 U.S.P., among other requirements, describes calomel as "A white, impalpable powder, showing only small, isolated crystals under a magnifying power of 100 diameters. Insoluble in water, alcohol or ether. In contact with calcium hydrate T. S., the salt is blackened. If 1 gramme of the salt be shaken with 10 c.c. of water or alcohol, the respective filtrates should not be affected by hydrogen sulphide T. S. or silver nitrate T. S. (absence of *mercuric chloride*)."

Several years ago the writer received a sample of calomel that gave a prominent yellow coloration when treated with lime-water. Yellow wash instead of black wash, if you please. The question immediately arose—is it possible that any manufacturer will put such a valuable medicinal agent as calomel on the market containing such an apparent quantity of corrosive sublimate? Further exami-

¹ Presented at the meeting of the *Penna. Pharm. Assoc.*, June, 1897.

nation showed that the calomel contained an appreciable quantity of this poisonous agent. Other makes were secured and all developed a greater or lesser yellowish coloration when treated with lime-water. The various available products were then critically examined according to the U.S.P. requirements, with the following results: The color varied from a white to a decided cream. Isolated broken crystals were present in all material examined. Minute traces of mercuric chloride were indicated in every instance.

Since examining the above samples the writer has watched the quality of this article with much interest; but thus far all efforts have failed to find a calomel absolutely free from corrosive sublimate when the U.S.P. tests were rigidly applied. In two cases, however, both the silver nitrate and the hydrogen sulphide failed to give absolute evidence of the mercuric chloride, but a transitional yellow was developed with even these when treated with lime-water. One of these was a beautiful crystalline (plates) product of Japanese origin, the other an old sample found in the laboratory.

Several questions arise in this connection. First, the yellowish coloration, and second, the relative solubilities of mercurous chloride, silver chloride and mercurous sulphide.

It is well known that the color of the various compounds of mercury is readily modified. In precipitating mercuric mercury with hydrogen sulphide, the resulting product frequently varies in color from white to black. The writer on several occasions has repeatedly washed calomel with water, to remove the soluble mercury compounds, but in every instance a yellowish coloration was developed at the point of contact, when the washed calomel was treated with lime-water. This would suggest the conclusion that calomel develops a transitional yellowish coloration at the point of contact when treated with lime-water.

The second question, viz.: the relative solubility of the above-named compounds, is an interesting one. We are informed by the Pharmacopœia, and other standard works, that calomel is *insoluble*. Silver chloride and mercurous sulphide are generally considered insoluble. According to A. M. Comey's "Dictionary of Chemical Solubilities" calomel and silver chloride are *nearly* or *almost* insoluble in water, while mercurous sulphide is *insoluble*.

F. Kohlrausch¹ and F. Rose, calculating from the electrical con-

¹ 1893, *Ztschr. phys. Chem.*, **12**, 241.

ductivity of calomel in water, at 18° C., have found that 1 litre of water dissolves 3.1 mg. of mercurous chloride. The same authorities,² by the electrolytic method, have found that 1 litre of water, at 18° C., dissolves 1.52 mg. of silver chloride. The difference of the relative solubilities of silver chloride and mercurous chloride is 1.58 mg. per litre. According to these experiments, there would be formed a certain amount of silver chloride, when a saturated aqueous solution of calomel is treated with silver nitrate. When we remembered that one part of silver can be detected in 800,000 parts of water, it can readily be seen why calomel is so often reported as containing corrosive sublimate.

Then again, if mercurous chloride is soluble at all in water, and mercurous sulphide is insoluble in the same menstruum, it naturally follows that hydrogen sulphide will produce a reaction with a saturated aqueous solution of calomel.

According to the writer's observations, calomel is nearly as soluble in alcohol as in water, but is insoluble in ether; at least, an alcoholic solution of calomel frequently gives a reaction with hydrogen sulphide, while an ethereal solution will not leave a residue when evaporated in a pure atmosphere.

While it is impossible to countenance any laxness in a matter of this kind, still the writer is of the opinion that the official requirements are slightly too rigid. As the matter now stands, the analyst must practically take it upon himself, if he reports favorably on any material submitted, or he must reject every sample submitted to him. Calomel does occasionally contain corrosive sublimate, and it is necessary to keep a strict surveillance over this product. But according to the most rigid tests, with the above noted exception, all calomel examined by the writer during the past few years has not contained over $\frac{1}{100000}$ of 1 per cent. of corrosive sublimate.

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Volatile oil of lovage, according to E. Braun (*Archiv der Pharm.*, **235**, 1), contains (a) a terpene, $C_{10}H_{16}$, resembling limonene, but not giving crystalline compounds with the halogen acids; (b) cineol, $C_{10}H_{18}O$; (c) isovalerianic acid; (d) acetic acid, as an oxidation product; (e) benzoic acid. The oil commences to boil at 170°, and begins to decompose at 200° C.

² 1893, *Ibid.*, **12**, 242.

ANALYSIS OF THE ROOT OF KALMIA LATIFOLIA.

BY HARRY MATUSOW, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 168.

This plant is a well-known evergreen of the natural order Ericaceæ, and is known under the various synonyms of laurel, mountain laurel, broad-leaved laurel, calico bush and spoonwood. It inhabits all sections of the United States, from the Atlantic Ocean to the Mississippi River, being especially abundant on the sides of hills and mountains. It is a shrub, from three to ten feet in height, and bears beautiful flowers.

The leaves of the plant are said to possess poisonous properties, due to andromedotoxin, which is found in a number of plants belonging to the Ericaceæ. As far as was learned, the root has not been previously examined; so in order to ascertain its constituents, a quantity of the root was collected by the writer at Lawnside, New Jersey, in July, 1896. The root was well cleaned, allowed to become air-dry and afterwards reduced to fine powder for proximate analysis. The results may be outlined in the order of their succession as follows:

Petroleum Ether Extract.—This amounted to .34 per cent. of the weight of the root. It consisted of caoutchouc, wax and a resin-like substance. The last had a dark brown color, and was insoluble in hot aqueous solution of potassium hydrate. Alcoholic solution of potassium hydrate dissolved it. From the solution so obtained diluted sulphuric acid precipitated a white substance which was soluble in alcohol, and gave precipitates with alcoholic solutions of ferric chloride and lead acetate.

Ether Extract.—Ether dissolved .89 per cent. of the root. Only a small quantity of the extract was soluble in water. The water solution was neutral in reaction. Treatment with Fehling's solution and acid showed the absence of glucosides. The common alkaloidal reagents failed to indicate the presence of alkaloids. That part of the extract which was insoluble in water was completely soluble in alcohol. The solution was acid in reaction. Water precipitated it, as did also alcoholic solutions of ferric chloride and lead acetate. The solution contained resin and phlobaphene. A portion of the alcoholic solution was evaporated to dryness, and the residue treated with potassium hydrate solution at the water-bath temperature. The

solution was filtered off from the undissolved portion, and when treated with diluted sulphuric acid in excess, it deposited a flocculent precipitate of resinous matter which showed no color reactions with strong mineral acids. The filtrate from the flocculent precipitate was shaken with chloroform in a separating funnel. The chloroformic layer was separated and evaporated. The following tests were applied to the residue:

Strong sulphuric acid—one drop produced a red color, which became more pronounced on warming. Strong nitric acid—a few drops produced a red color which intensified on warming.

Strong hydrochloric acid, even when warmed, produced no change.

These reactions correspond, except in the case of hydrochloric acid, with those obtained by previous investigators of the leaves of this plant, and ascribed by them to andromedotoxin.

Absolute Alcohol Extract.—The extract amounted to 3.68 per cent. It was of a dark brown color and had a porous character. Water dissolved an amount equal to 1.48 per cent. of the root. The residue consisted of phlobaphene. The water solution was acid in reaction. It contained a small amount of tannin, which reacted as follows:

Lead acetate, flesh-colored precipitate. Ferric chloride, brownish precipitate. Ammonia ferric sulphate, brownish-green precipitate. Gelatin, flesh-colored precipitate. Bromine water, yellow precipitate. Calcium hydrate, reddish precipitate.

These reactions were confirmed by tests applied to a cold-water infusion of the original root. They indicate a tannin similar to that of the oak barks and to the one found in the leaves of *Kalmia latifolia*, as described by DeGraffe in this JOURNAL for June, 1896. The alcoholic solution of the phlobaphene gave the same reaction with ferric chloride as the tannin. Traces of glucose and saccharose were present. Alkaloids, glucosides and neutral principles were not found after a complete system of application of immiscible solvents to both acid and alkaline water solutions of the extract.

Water Extract.—Cold water extracted 3.2 per cent. of organic matter from the root. This comprised .92 per cent. of mucilage and albuminous matter, a trace of glucose and nearly 1 per cent. of saccharose.

Alkaline Water Extract.—Water made alkaline with sodium hydrate dissolved 5.44 per cent. of organic solids. The extract showed .98 per cent. of mucilage and albuminous matter.

Acidulated Water Extract.—The root yielded 1.17 per cent. of organic solids to water acidulated with hydrochloric acid. Pararabin was present. The next treatment was with boiling acidulated water, but the extract was not worked.

Starch.—This constituent was determined on a separate portion of the original root. Two determinations were made; one showed 11.38 per cent., the other 11.43 per cent.—an average of 11.40 per cent.

Treatment of the residue from the boiling with acidulated water with chlorine water, produced a loss which indicated 20.18 per cent. of lignin.

The residue from this treatment was ignited. The loss indicated 47.40 per cent. of cellulose and allied substances. Moisture was found in the root to the extent of 5.06 per cent. The amount of ash was 1.24 per cent. A qualitative analysis of the ash showed the presence of the following:

Water dissolved 16.16 per cent. of the ash. The solution contained aluminum and potassium combined with hydrochloric and sulphuric acids. Hydrochloric acid dissolved 33.14 per cent. of the ash. The solution contained calcium, magnesium, aluminum, iron and manganese combined with phosphoric acid. The remainder of the ash consisted of adhering soil.

NOTES ON OPIUM ASSAYING.¹

BY FRANK X. MOERK, PH.G.

For several years past the writer has adopted certain procedures in assaying gum opium, the results of which were expected to assist in perfecting this assay process.

The sample of gum opium received for analysis is weighed and dried for about twelve hours at 80-85° C.; drying is facilitated by cutting the sample into pieces about the size of cherries before weighing. The loss in weight is noted, and the partly dried opium is coarsely powdered and thoroughly mixed; of this, 2 grammes are taken for the residual moisture estimation, and 8 grammes for the morphine estimation, according to the U.S.P. The latter quantity, as a rule, corresponds very closely to 10 grammes moist opium; the exact quan-

¹Read at the meeting of the Pennsylvania Pharmaceutical Association, June 22, 1897.

tities of moist and perfectly dry opium are, however, to be calculated from the loss sustained in drying. This procedure enables a uniform sample from which concordant results can be obtained when assayed at some subsequent time, and calculated to opium containing the original quantity of moisture.

In powdering the partly dried opium in glass or iron mortars, electricity is developed and there is difficulty in avoiding loss from particles being thrown about; this phenomenon was not noticed when using wedgewood mortars.

The crude morphine obtained by the U.S.P. process was first weighed on counterbalanced filters and again after transferring to a watch-glass; it will be noticed that there is, in the majority of cases, a difference due to but a few milligrammes. In transferring, a camel's hair pencil has to be used with some force to remove all of the morphine from the filter, and this generally results in loosening some of the fibres of the paper, which then contaminate the morphine.

The purity of the morphine is an important matter; for its determination, several methods are in use, as the solubility in lime-water, the solubility in alcohol and the ash method. If we look into the question of the impurities which can be present in crude morphine, there may be other opium alkaloids, particularly narcotine, sulphates of calcium and strontium, phosphates of calcium and magnesium, meconates of potassium, calcium and magnesium, and generally a little coloring matter; this does not exhaust the list of substances that are possible, or even of those that have been found, but it is sufficiently comprehensive to allow some reflections upon the probable accuracy of these several methods of correction. The *alcohol method* will give as morphine everything soluble in alcohol, hence, narcotine and coloring matter will be returned as morphine; it reveals the ash-yielding constituents, particularly if absolute alcohol be used; and if, after weighing the insoluble matter, this be ignited and weighed, the factor for calculating ash into impurity can be obtained and compared with the present factor, which is simply theoretical. The objection to the alcohol method has been the expense and the difficulty of filtering out the very fine precipitate.

The *lime-water method* was the one first proposed for ascertaining the purity of the morphine and was particularly recommended as a means of detecting narcotine. After Stillwell proposed the alcohol method Squibb, in a series of experiments, obtained almost identical

results in comparing these two methods. The ash obtained by igniting crude morphine, was considered to be pure calcium oxide or carbonate (depending upon the temperature of ignition), derived from calcium meconate, until the writer in AM. JOUR. PHARM., September, 1894, proved that the ash was a very complex mixture, and this has since been verified by Mr. L. F. Kebler. The writer also raised the question as to the effect of lime-water upon this complex mixture of salts, giving rise to the ash; experiments made since that time enable me to say that the lime-water solution, even after reprecipitation of the morphine, is always more or less colored; the reprecipitated morphine dissolved in dilute sulphuric acid frequently yields a pink to rose-red colored solution, due to some foreign organic substance which requires several reprecipitations for its elimination; in dissolving crude morphine in lime-water I have observed that, if perfect solution does not result, a fine white precipitate deposits at first, which, in the course of the half hour allowed for the solvent action of the lime-water, changes to a yellow flocculent precipitate; 0.050 gramme of a precipitate (obtained from the mother-liquor of an opium assay), allowed to stand for half an hour with 10 c.c. lime-water, then filtered, and washed first with lime-water, then with distilled water, dried at 50-55° C., and weighed, showed an increase in weight of 0.004; it had also changed in appearance as just described. These experiments confirm my previous supposition of the chemical change taking place by the lime-water solution, but I had rather expected a decrease in the weight, because of the presence of potassium meconate, and its possible reaction with lime-water to form calcium meconate and soluble potassium hydrate; but the insoluble part in lime-water gave apparently as good a test for potassium salts with platinic chloride as did the original substance. An interchange between magnesium meconate or phosphate and calcium hydrate, because of the formation of insoluble calcium meconate or phosphate and insoluble magnesium hydrate, will cause an increase in weight and seems probable. From these experiments, we must say that all of the organic matter is not revealed by this test, and that the ash-yielding substances are, at least in part, chemically changed; so that this correction can also not be considered an accurate one.

The *ash method* will not reveal organic matter, and based upon the assumption that the ash consists entirely of calcium oxide or

carbonate derived from calcium meconate, and to which the ash is calculated by the use of factors (4.55 for calcium oxide and 2.56 for calcium carbonate), despite the fact that considerable potassium carbonate is present (which should require a different factor), and disregarding entirely that the sulphates and phosphates of the metals present sustain comparatively little loss by ignition (the factor for which cannot be foretold), the result being that the correction based entirely upon the weight of the ash will be too high unless counterbalanced by the presence of foreign organic matter, an assumption which cannot be proven at the present time.

A number of comparisons of the lime-water and ash methods have been published and agreed very well. Any difference between the corrections could be allowed for from the above statements. In May, 1896, Mr. L. F. Kebler published in the AMERICAN JOURNAL OF PHARMACY a series of comparisons in which some new possibilities were brought forward. Of the *seventeen* samples reported, *one* yielded no ash and no correction by either method; *one* the same correction by both methods; *seven* a higher correction by the lime-water method with the percentage of ash normal, *i. e.*, below either correction; *five* a higher correction by the ash method, with the percentage of ash normal; and *three* a higher correction by the ash method, with the percentage of ash abnormal, *i. e.*, greater than the lime-water correction. To explain these results it must be admitted that in some cases there is an ash-yielding substance which is soluble in lime-water, whilst in other cases there must be present some organic impurity which is not soluble in lime-water, and of course yields no ash.

While not one of these methods of correction can be considered satisfactory, the writer has given preference to the lime-water method as involving on the one hand less change during the manipulation, and on the other hand because of the easier filtration of the solution, and the possible reprecipitation of the morphine; care must be taken, by keeping the funnel covered with a watch-glass to prevent the formation of calcium carbonate if working near a flame. In the assays to be detailed, the lime-water correction was used; 0.5 gramme of the well-mixed crude morphine was weighed into a flask and thoroughly moistened with 5 c.c. lime-water before adding the remaining 45 c.c.; rotate the contents of flask repeatedly during half an hour, and then filter the solution through counterbalanced

filters (7 centimetres), rinsing the precipitate in the flask upon the filter by the use of small portions of the filtrate; wash the flask and filter with 5 c.c. lime-water, added in portions of 1 c.c. After the last c.c. drains off, set aside the filtrate and washings and wash the filter with 5 c.c. distilled water applied in portions of 1 c.c.; after draining press the filter between bibulous paper and dry at 50-55° C. to constant weight; this weight is then calculated to entire weight of crude morphine, and, subtracted from the weight of the crude morphine as weighed on a watch-glass, gives the weight of the *pure morphine*, which is then calculated to 100 parts of opium.

The lime-water solution of the crude morphine is thoroughly agitated after adding 6 c.c. ether (just enough to saturate the solution, and for the purpose of rendering the precipitation of morphine as complete as possible; morphine, particularly in presence of foreign organic matter, is less soluble in water saturated with ether than in pure water); 0.150 gramme ammonium chloride is next added and agitation continued for ten minutes before setting aside for 10 to 12 hours, or over night (the 55 c.c. lime-water require 0.140 gramme ammonium chloride for neutralization, so that there is but a slight excess added); filter through counterbalanced filters (7 centimetres); rinse the flask several times with a little of the filtrate to remove the remaining morphine crystals, and then wash the morphine and filter with 15 c.c. distilled water, applied in portions of 1 c.c.; dry the filter as above described, at 50-55° C., and weigh. The combined weights of the recovered morphine and of the correction subtracted from 0.500 gives the loss sustained in the purification, and represents chiefly the morphine remaining dissolved in the 55 c.c. of mother-liquor.

In looking over these results it will be seen that the impurity in the crude morphine does not depend so much upon the length of time in which the assay is allowed to stand as upon variations in the samples of opium (the assays standing 15 hours, for instance, illustrate this point); it has previously been proven that in any given sample of opium the impurity increases with the time allowed for precipitation.

Believing that the great difference in the quantity of the impurity was due to variation in the ash-yielding constituents, a number of the samples of opium, kept in the partly dried condition, were examined. Two grammes of the sample were dried at 100° C., then in-

Number and Nature of Opium.	Date of Analysis.	Percentage of Moisture.	Hours Allowed for Precipitation of Morphine.	PERCENTAGE OF CRUDE MORPHINE WEIGHED.		Percentage of Pure Morphine by Lime-Water Test.	Percentage of Crude Morphine Insoluble in Lime-Water.	Percentage of Crude Morphine Recovered from Lime- Water Test.	Percentage of Loss Incurred by Solution in Lime-Water.	Weight of Morphine Left in s.c.c. Lime-Water in Mother- Liquor.
				On Filters.	On Watch- Glass.					
1. Gum	10-15-94	25.16	8	11.62	11.56	11.48	0.70	86.60	12.70	0.0635
2. Powdered	11- 2-94	9.56	21	12.09	12.63	12.39	1.90	89.70	8.40	0.0420
3. "	12-18-94	7.62	15	13.77	13.09	12.90	5.60	88.00	6.40	0.0320
4. Gum	1-14-95	23.62	15	12.20	12.18	11.99	1.60	91.90	7.50	0.0375
5. "	2-28-95	23.39	13	12.19	12.18	12.14	0.30	89.70	10.00	0.0500
6. "	4- 4-95	19.60	13½	12.45	12.42	12.34	0.70	90.90	8.40	0.0420
7. "	5- 9-95	23.10	17½	11.36	11.33	10.91	3.70	88.70	10.60	0.0530
8. "	6-25-95	23.29	12	11.57	11.55	11.53	0.20	90.90	8.90	0.0445
9. "	7-26-95	23.70	12	11.18	11.15	11.08	0.60	90.20	9.20	0.0460
10. "	10-24-95	25.35	14½	10.76	10.74	10.72	0.20	90.30	9.50	0.0475
11. "	12-17-95	22.73	—	10.45	10.43	10.39	0.40	91.10	8.50	0.0435
12. "	2-19-96	26.78	16½	11.32	11.27	11.20	0.60	91.40	8.00	0.0400
13. "	3-23-96	22.93	13	9.69	9.66	9.62	0.40	91.90	7.70	0.0385
14. "	5-19-96	26.10	13½	10.04	10.02	8.60	14.20	79.20	6.60	0.0330
15. "	7-10-96	23.32	15	12.08	11.96	10.38	13.20	78.40	8.40	0.0420
16. "	7-15-96	25.04	17	10.41	10.34	9.31	10.00	82.00	8.00	0.0400
17. "	7-29-96	23.40	16½	10.80	10.72	9.58	10.60	82.20	7.20	0.0360
18. "	10-13-96	22.92	13	11.42	11.38	10.15	10.80	—	—	—
19. "	2- 8-97	23.10	15	11.24	11.18	10.66	4.70	86.40	8.90	0.0445

cinerated for total ash; this, macerated with 10 c.c. water for one-half hour, filtered, and filter and contents washed with water, 1 c.c. at a time, until the filtrate measured 20 c.c.; the filter, with insoluble portion of the ash, was dried, ignited and weighed, the difference between that and the total ash giving ash soluble in water. The figures are in terms of percentage and relate to perfectly dried opium; for convenience of comparison the percentage of impurity in the crude morphine is appended. The figures in the last column are results of another series of experiments, to be mentioned a little later.

Number.	Moisture.	Total Ash.	Soluble Ash.	Insoluble Ash.	Impurity in Crude Morphine.	Ash of Dregs.
8	5'00	6'37	3'21	3'16	0'20	2'68
10	5'22	5'51	2'95	2'56	0'20	2'56
14	4'90	6'68	3'50	3'18	14'20	2'92
15	5'27	5'36	3'17	2'19	13'20	1'87
16	5'65	7'15	3'60	3'55	10'00	2'94
17	5'05	5'53	3'53	2'00	10'60	1'79
18	4'95	7'59	3'17	4'42	10'80	3'71
19	3'47	5'36	3'29	2'07	4'70	1'81

There is no clue here for an explanation, as comparison of No. 8 with Nos. 15, 18 and 19 will prove, unless it were by quantitative analysis, which the quantity of ash did not permit. The aqueous solutions, excepting Nos. 8 and 15 and all of the insoluble ashes moistened with water, gave pink or red colorations with phenolphthalein, but a single drop of a very dilute sulphuric acid discharged the color; the insoluble ashes were mixed with water and titrated with dilute sulphuric acid using methyl-orange as indicator, but the results were as conflicting as the above ash determinations.

As a further probable explanation was based upon the acidity of the aqueous opium infusion dissolving some of what in the preceding table is called insoluble ash, and the addition of ammonia afterwards reprecipitating this, a series of experiments were made, in which 2 grammes were extracted with water, as in the official assay, to make 64 c.c. filtrate; the dregs were dried and ignited, and the results, representing percentage of ash left in the dregs of perfectly dried opium, are found in the last column of the preceding table. The determination with No. 8 was made last, and was sufficient to shatter

conclusions based upon the other seven samples; it will be seen that there is a decrease of from 0.21 to 0.71 per cent. between the insoluble ash and the ash of the dregs, in the case of those samples yielding an impure crude morphine, whilst No. 10, yielding a pure morphine, showed no decrease.

While these experiments were going on, I also tried in various ways and with different indicators to determine the acidity of the opium or opium infusion directly, but these efforts were fruitless.

The loss in the reprecipitation of the morphine varies from 0.033 to 0.0635 gramme., and while all of this may not be morphine, owing to the influence of the lime-water upon the impurities in the crude morphine, it opens up the question of the morphine left in the mother-liquor in the assays proper. When it is remembered that this operation was carried out so as to minimize the loss, that the use of alcohol and of larger quantities of ether in the assays will necessarily cause greater loss, and that the morphine actually weighed must be subjected to a correction which itself is arbitrary, one can realize that much work will yet have to be done before a satisfactory or accurate opium assay process is arrived at. Of the two problems to be solved, the one disclosing accurately the quantity of morphine in mother-liquors is considered the more difficult; in fact, the solving of this will practically also solve the purity of any isolated morphine.

ANALYTICAL PROCESSES AND LABORATORY NOTES.

BY CHARLES H. LAWALL.

ASSAY PROCESSES FOR KOLA, GUARANA AND COFFEE.

A method for the estimation of caffeine in kola, guarana and coffee, which obviates the use of the Soxhlet extraction apparatus, has been used with success during the past year. The results agree closely with those obtained by the long and tedious processes formerly employed, and can be obtained within a much shorter space of time. It resembles closely the process recently suggested by Dr. Keller for the determination of caffeine in tea. The directions are as follows: Into a separatory funnel of convenient size, place 5 grammes of the drug and 5 c.c. 10 per cent. ammonia water. Allow the mixture to stand for thirty minutes, then shake out the alkaloid with chloroform, using three portions of 20 c.c. each.

If emulsification occurs, add powdered magnesium carbonate in small quantities until separation takes place. Transfer the mixed chloroform washings to a tared flask, recover the solvent in the customary manner, and weigh the residue, which consists of fat and alkaloid together.

Dissolve the fat with warm ether, using successive fractions of 20 c.c., until the ethereal washings leave no perceptible residue upon evaporation of a small quantity. With careful manipulation, the ether can be decanted each time without loss of caffeine; but as a precautionary measure, the ethereal washings may be filtered, the filter washed well, first with ether and then with chloroform, transferring the chloroform washings back to the flask for evaporating and weighing. The residue in the flask is almost pure caffeine, and the difference between the weights of the first residue and the last is the amount of fat present in the drug.

In the case of kola, the ether also removes the theobromine, which is usually but a small percentage and may be ignored.

The following comparative results have been obtained:

KOLA NUTS.

No. 1, Exhausted with chloroform in Soxhlet	1'39	per cent. caffeine.
No. 2, Exhausted by the foregoing process	1'37	" "
No. 3, " " " "	1'48	" "
No. 4, " " " "	1'43	" "
No. 5, " " " "	1'40	" "

GUARANA.

No. 1, Exhausted with chloroform in Soxhlet	4'32	per cent.
No. 2, Exhausted by the foregoing process	4'68	" "
No. 3, " " " "	4'62	" "

In assaying the fluid extracts of the drugs above mentioned, however, the Lloyd ferric hydrate process gives the most satisfactory results.

ESTIMATION OF ALKALOIDS IN WHITE HELLEBORE.

In answer to query No. 48 of the proceedings of this Association for 1896, the following results are submitted. The well-known general assay process of Dr. Keller was used with satisfactory results, the details being as follows: Place in a dry flask—

White hellebore	10 grammes.
Chloroform	25 "
Ether	75 "
10 per cent. ammonia water	10 "

Shake vigorously, and allow to stand for six hours or over night, then add 5 c.c. 10 per cent. ammonia water, shake well and pour off 50 grammes of the clear solution (representing 5 grammes of the white hellebore). Transfer the solution to a separatory funnel and shake out the alkaloid with acidulated water, using three fractions of 20 c.c. each. Place the aqueous washings in a separatory funnel, and, after rendering alkaline with ammonia water, shake out the separated alkaloid with a mixture of chloroform 3 volumes, ether 1 volume. Transfer these washings to a tared flask, recover the solvent, if desired, and weigh the residue, which is the total amount of alkaloid in 5 grammes of the drug.

The results shown below were obtained by the foregoing process, using the commercial drug in the form in which it is sold for an insecticide. Five different samples assayed respectively:

No. 1, 1.20 per cent.; No. 2, 1.24 per cent.; No. 3, 1.25 per cent.; No. 4, 1.12 per cent.; No. 5, 1.18 per cent. alkaloids.

A sample of the whole drug was also ground and assayed. This yielded 1.75 per cent.—a somewhat higher yield, which should be verified by assaying numerous different samples before accepting it as a standard. The results as obtained show the commercial drug to be uniform and about 1 per cent. would be a fair limit for the minimum allowable yield of alkaloids by this process.

ARE C. P. CHEMICALS CHEMICALLY PURE?

In answer to query No. 44, requesting information upon the subject, it is difficult to give a definite reply. The term *Chemically Pure*, commonly abbreviated *C. P.*, is used with such frequency when applied to inorganic compounds, that it loses its force in a great degree. To comply with this description accurately, a chemical should be absolutely free from all foreign compounds, an ideal requirement seldom found in practice. As generally applied, it has come to mean simply a very high degree of purity, such as is required for analytical reagents, and, according to this interpretation of the term, the quality of most *C. P.* chemicals sold, is in accordance with the description. As an illustration of this accepted meaning, sulphuric acid may be mentioned. This acid is listed as "*C. P.*," and also "*C. P.*, free from arsenic." The latter commands the higher price, thus indicating a degree of purity higher than "*C. P.*"

Some cases have been observed in which the term was clearly

misapplied. Among these were "C. P. chemicals for photographic purposes," as sodium thiosulphate and sulphite containing iron and zinc; also sodium carbonate containing large quantities of chlorides and sulphates. Fortunately, instances of this kind are rare, and, with the exception of one manufacturer who evaded the question by claiming that C. P. meant commercially pure, it has been found that chemicals when designated C. P. conform to these requirements as closely as is practicable. In this connection, the fact that even the U.S.P. is somewhat inconsistent in its requirements for the purity of certain chemicals may be new to some persons. The requirements of the U.S.P. for the purity of carbonate and bicarbonate of sodium allow a limit of chlorides and sulphates in each case. In benzoate, salicylate and other salts of sodium, which are made from one of the first-mentioned bases, absolute freedom from chlorides and sulphates is required, with no apparent reason for such an increase in the standard of purity; the result being that the salts of sodium, such as those mentioned, are found, in most cases, to contain traces of chlorides and sulphates, even when labelled U.S.P. The fulfillment of such increased requirements generally means an increase in the cost of the compound, with no practical benefit resulting therefrom.

In criticising the quality of C. P. chemicals, care should be taken not to overstep the bounds of reason, as in a certain case where a bottle of C. P. ferrous sulphate was returned after some weeks as not answering the tests for a pure salt. As the bottle was only partly filled, and loosely stoppered, the complaint was unreasonable. It is easier to find fault with an article than it is to make excuses for any deficiencies discovered; but, for the interests of commercial harmony, let us avoid being hypercritical. For use as reagents, chemicals should be required of the highest standard possible, but for prescription use it is unnecessary to require conformity to a standard of purity which raises the cost of the compound without increasing its practical value.

A chart of the *Mineral Products of the United States* from 1887 to 1896 inclusive, has recently been issued by the U. S. Geological Survey. The products are divided into two classes, metallic and non-metallic. The grand total in value of both metallic and non-metallic products amounted in 1887 to \$520,714,474, and gradually rose to \$648,670,798 in 1892, when it dropped off some \$74,000,000 in 1893, the values thereafter being somewhat variable, and in 1896 they had risen to \$611,510,700.

A CONTRIBUTION TO THE KNOWLEDGE OF SOME
NORTH AMERICAN CONIFERÆ.¹

BY EDSON S. BASTIN AND HENRY TRIMBLE.

(Concluded from page 97, of this Volume.)

TSUGA MERTENSIANA, CARR.

DISTRIBUTION AND GENERAL CHARACTERS.

This species is known as Western hemlock or Californian hemlock spruce. It was first named and described by the Russian botanist, Bongard, who gave it the name *Pinus Mertensiana*, and the locality Sitka, in Alaska. It occurs, however, on the Pacific Coast, from the vicinity of San Francisco through Oregon to Alaska.

While similar in appearance to our Eastern species, it is, when fully developed, a tree of much larger size, sometimes attaining a height of 200 feet. It is also straighter grained, and has a redder and usually thicker bark, but the most distinctive difference, perhaps, is in the fruits and seeds, the scales of the cones being more elongated, and the wings of the seeds being relatively longer and straighter.

MICROSCOPICAL STRUCTURE.

The barks of the Eastern and Western species are the only ones that have been examined microscopically. They showed, as might have been expected, a great similarity in structure, though there appeared to be some characters which we may rely on for distinguishing them. In both it was seen that cork formation begins early, and, in all cases, where the bark was taken from stems more

¹The death of Professor Bastin has necessarily brought the publication of this series of papers to a close. As there was sufficient material left by him to nearly complete the structural description of the *Tsuga*, it was thought the publication of this paper, by completing the genus, would make a more acceptable ending. Professor Bastin was working on the structure of *Tsuga Caroliniana* until shortly before his death, but it is to be regretted that the drawings were not completed. As all the originals of the illustrations in this series of papers were from his pen, no attempt has been made to have the few remaining ones of this genus completed by others.

A number of reprints have been prepared, and copies will be mailed to any one applying for them, until the supply is exhausted.

It is the hope and expectation of the surviving author to continue the chemical work on this natural order, as a large number of samples have been collected, much work has been completed, and the results will be published as rapidly as possible.

than two years old, the secondary cork formations had invaded the inner layer of the bark and bands of cork were observed crossing at various angles the medullary rays. The cork in both was colored

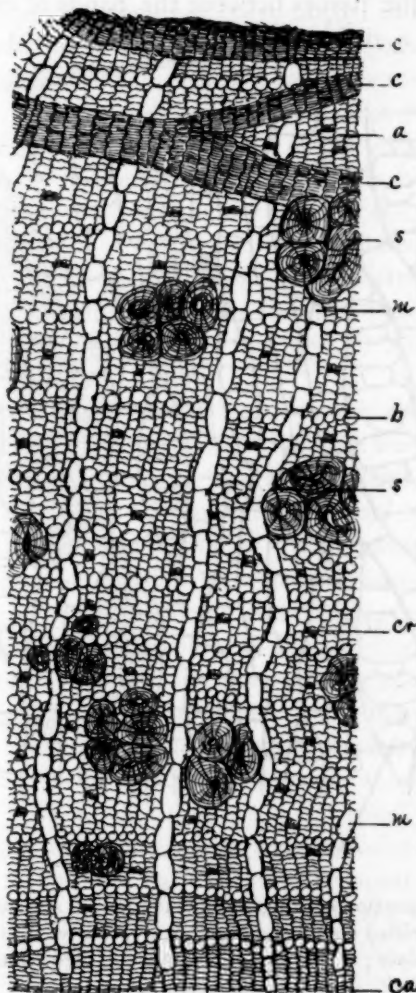


FIG. 57.

Fig. 57.—Small portion of cross-section of bark of *Tsuga Mertensiana*, magnified about 50 diameters. *c, c, c*, bands of secondary cork; *a*, intervening dead tissues, composed of sieve and parenchymatous elements, and, like the other species, rich in tannic, resinous and coloring matters; *s, s*, groups of stone cells; *m, m*, relatively large, fusiform medullary-ray cells; *b*, band of large parenchymatous cells; *cr*, crystal cell; *ca*, cambium cells.

a deep purple, and this coloring matter was bleached out with difficulty, even by Labarraque's solution. This coloring matter appeared to be different in character from the reddish-brown coloring substance found in the tissues between the bands of cork, for not only was the latter a different shade of red, but it bleached more readily.

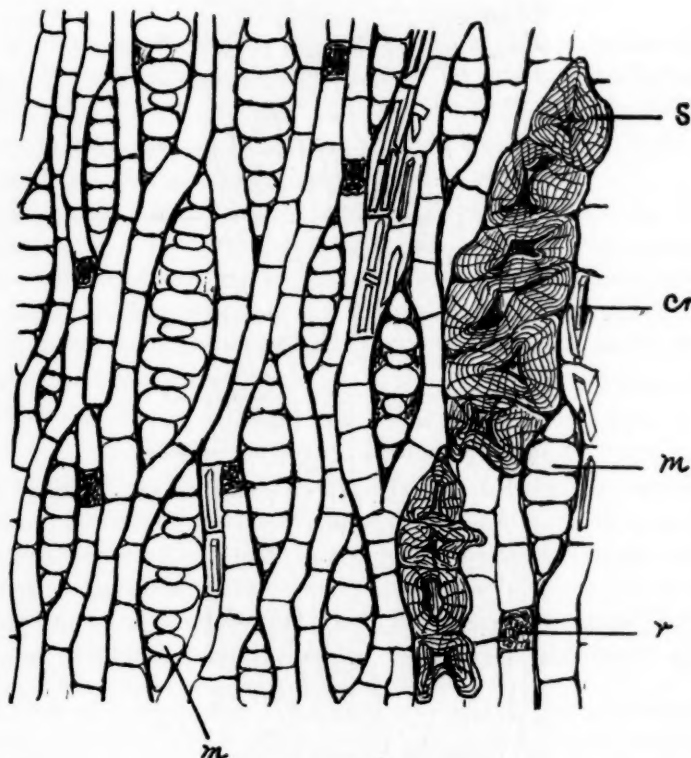


FIG. 58.

Fig. 58.—Small portion of longitudinal-tangential section of bark of *Tsuga Mertensiana*, magnified about 75 diameters. *s*, cluster of stone cells; *cr*, crystals of calcium oxalate; *m*, *m*, medullary rays; *r*, oleo-resin cell.

Tests for tannin showed in *Tsuga Mertensiana* that the white or colorless younger portions of the bark contained but little of it, while the older portions, particularly the dead sieve and parenchyma tissues between the bands of secondary cork, were observed to be particularly rich in it.

Stone cells of large size, and often quite irregular, occurred, either

isolated or clustered in groups of several or many, throughout all except the youngest portions of the inner bark. They were quite numerous, but distributed without apparent order. They were marked with numerous very fine pore-canals, and very numerous and fine concentric lines. Although abundance of starch was found in the bark of *Tsuga Canadensis*, none was observed in the bark of *T. Mertensiana*. It is possible, indeed probable, that a sample of the latter collected at some other season of the year would show the presence of starch. The medullary rays in both barks were observed to be composed of single rows of cells, and these were radially elongated and of large size as compared with those of adjacent tissues; but those of *T. Mertensiana* were, on the average, larger, and the rays in this species, as seen in a longitudinal-tangential section were composed, on the average, of a larger number of cells.

These differences in the medullary rays are, perhaps, the most constant ones between the two barks. In both barks an abundance of calcium oxalate crystals was observed. (See *Fig. 55*.) They were mostly in the form of long prisms, and were contained in rows of elongated cells of narrow diameter, which traversed the bark in the direction of its length. The crystals were frequently associated in the containing cells with resinous and coloring matters. In form and arrangement they did not differ in the two barks, but appeared to be rather more abundant in the Pacific Coast species.

Oleoresin cells appeared to be about equally abundant in the two species. Those that did not also contain crystals were isolated or in rows of two or three, and the cells were shorter and broader than the crystal cells, though they were not usually so large as the parenchyma cells, with which they were associated. They were scattered through the inner bark without apparent order. Besides the oleoresin cells proper, just described oleoresin, was seen to occur in many cells not especially devoted to secretions; this was particularly true of the cells in the older portions of the bark.

CHEMICAL COMPOSITION.

The constituents of *Tsuga Mertensiana* do not appear to have been investigated. The work for this paper was mostly confined to an estimation and examination of the tannin in the stem bark. The sample used in the investigation was collected by Professor F. E.

Lloyd, of Forest Grove, Oregon. The following results were obtained:

	Per Cent.
Moisture	5.76
Ash in absolutely dry substance	1.42
Tannin in absolutely dry material	11.37

A quantity of the tannin was prepared, purified and submitted, after drying at 120° C., to elementary analysis, whereby the following percentages were obtained:

	Per Cent.
Carbon	59.11
Hydrogen	4.93
Oxygen	35.96
	<hr/> 100.00

These results and the qualitative reactions indicate that the tannin of *Tsuga Mertensiana* is identical with that from *T. Canadensis*, and, therefore, with that from the bark of a large number of species of oak.

ECONOMICS.

The wood of *Tsuga Mertensiana* is pale, tough and soft, and is often used for building purposes. The bark of the roots yields a strong fibre that is said to be employed for seines and nets, probably by the Indians. Authorities differ somewhat in regard to the resin, Kellogg stating that it yields a considerable quantity, while others report the resin as scarce. The bark of the trunk, with its rich percentage of tannin, has always been in demand for making leather.

TSUGA CAROLINIANA, ENGELM.

DISTRIBUTION AND GENERAL CHARACTERS.

The Carolina hemlock is found along the Allegheny mountains from southwestern Virginia to South Carolina. It has been found at an elevation of 4,200 feet. It does not occur very abundantly, and, because it is said to be a rather handsomer tree than *T. Canadensis*, it is cultivated somewhat at the North.

Carolina hemlock is not a very large tree; its height is given by different authorities as 40 to 80 feet. The wood is brownish in color, soft and brittle. The cones and leaves resemble those of the common hemlock, but both are a trifle larger.

CHEMICAL COMPOSITION.

The specimen used in this investigation was obtained from the Highlands Nursery, near Kawana, North Carolina. No published record can be found of an examination into the composition of any part of this tree. The leaves, the stem bark and the root bark were partly examined with the following results :

	Moisture.	Ash in absolutely dry material.	Tannin in absolutely dry material.
Leaves	7.07	2.70	4.52
Stem bark	8.22	1.44	18.35
Root bark	5.95	2.20	17.02

The ashes of these several parts contained potassium and calcium as phosphates and carbonates, and silica ; besides these, the ashes of both barks contained sulphates. No further investigation was made of the tannin, but it is safe to predict its identity with that from the other species.

ECONOMICS.

On account of the scarcity of this tree, it does not appear to have been put to any practical use, although a comparison indicates that it could be applied to all the uses now possessed by the common hemlock.

INSECT POWDERS OF COMMERCE.¹

BY GEORGE REYNOLDS DURRANT.

During the past quarter of a century at least twenty eminent chemists, pharmacists, and microscopists have devoted some attention to the physical characteristics, chemical constituents, and toxic properties of the insect powders of commerce. In the earlier part of this period the references were exclusively to the powder from the flowers of *Crysanthemum caucasicum*, or Persian variety, which gradually gave way to the Dalmatian kind produced from the flowers of the *Crysanthemum cinerariæfolium*, and it is possible that the Dalmatian replaced the Persian variety because the latter was the first kind to be grossly adulterated ; at least it is true in my experience that both kinds are equally useful if equally free from sophistication.

A careful study of the whole of the subject is more likely, in the absence of much personal experiment and thought, to confuse the

¹ *Pharmaceutical Journal*, June 12, 1897.

reader than to provide him with such information as will enable him to distinguish the true powder from sophistications, which are still as common, although changed in character, as they have been at any time since the Persian powder gave way to its honester rival. To any one who has worked on this subject for a few years, the last paragraph may appear to be superfluous, but it is evident that there is still a plentiful lack of knowledge on the part of the majority of buyers, or it would be impossible to account on any other hypothesis for the enormous amount of grossly sophisticated insect powder which is sold as genuine every season.¹

The object I have had in view in recording the results of several years' attention to this subject, is to provide a ready means of quickly and cheaply ascertaining if a given sample of insect powder is what it is represented to be by the seller, but before proceeding to this part of the subject, it will be profitable to briefly set forth the results of the work of other investigators. These references will not be by any means exhaustive of the subject, but will include most of the literary notices which have come within my own knowledge.

¹ While engaged in preparing this paper for the press, a curious confirmation of my contention has been supplied by a correspondence with a provincial firm of dealers in insect powder. I have no reason to doubt the *bona fides* of the firm, and must therefore conclude that such large sellers of insect powder as they claim to be are yet profoundly ignorant of the characteristics of true insect powder. I fear my charity is not sufficiently broad to give credit for good faith in this firm's opinion on the London trade in insect powder! The following short extracts are reproduced from this correspondence: In reply to my request for samples and quotations, "Thank you for your enquiry, and are sending samples of insect powder from closed flowers, 100 s. per cwt., and from half open flowers at 75 s. per cwt."

* My reply to this quotation expressed regret at the misleading description, as both samples were grossly adulterated, which drew a most indignant letter. "In reply to your letter, we think the party conducting the analysis must have made some miscalculation, as we are direct importers from Austria, and have, from the grinders there, the fullest assurance of its genuineness, and that the 'closed' and 'half-closed' are from flowers of that description and from flowers only. We have sold the same article for seven years, and our sale has greatly increased. As regards the London price for insect powder, the import offered in London is second rate, both in quality and quantity, and consists only of odd lots that have passed through several dealers' hands. We write strongly on this subject because we should not have been able to advance our trade in this article to its present state if we had been capable of misdescription!"

It will be found that the literature of the subject divides itself into the following sections:

- (a) Toxic constituents.
- (b) Microscopic appearance.
- (c) Adulterations.

It is intended to keep this division of the subject so far as may be possible and convenient.

So far back as 1863, Hanaman Roch (National Dispensary) attributed the insecticidal value of the powdered flowers of *Crys. caucasicum* to a volatile oil. Some years after, in the seventies, Semenoff appeared to be practically in agreement with this statement, but treated the matter more broadly, if less definitely, by substituting "volatile substance" for the more definite, if less accurate, "volatile oil." Immediately after in (1876), Jousset de Bellesme stated that, in his opinion, the active toxic principle was a crystalline alkaloid. In 1877 this last statement was corrected by R. Rother (*Druggists' Circular and Chem. Gazette*), in a paper giving the results of a very systematic and practical investigation; the conclusions at which this writer arrived are as follows: There is no crystalline alkaloid; there are (a) an oleoresinous greenish-yellow acid, "persicein;" (b) another acid body, "persiretin," both inactive; (c) active principle, a glucoside converted by boiling into "persiretin" and glucose. These constituents are all soluble in ether alcohol, benzine and petroleum ether, and insoluble in chloroform. With the latter part of the statement, referring to the solubility of all the constituents of any value in ether, etc., I can cordially agree. Very shortly after the appearance of this article by Rother, a notice appeared in the *Bulletin Soc. Chim.* by G. Dal Sie, in which he claims that the active toxic principle is to be found in a volatile acid existing in the flowers in a free state. M. Finzelberg (*Pharm. Centralhalle*, 1880) proved that a concentrated tincture of the flowers had definite insecticidal properties, and this statement has been confirmed by my own experiments on flies. O. Tester (*Pharm. Journ.* [3], XII, 359), states that the active principle is a soft resin. At the British Pharmaceutical Conference, 1888, a paper was read by William Kirkby on the microscopical characteristics of the flowers of *C. caucasicum* and *C. cirerariæfolium*. The paper was valuable so far as the subject was treated, but it was less complete than the author intended, inasmuch as sophistications were not

taken into consideration. Although the paper itself was thus limited in scope, the discussion which followed covered the whole ground. Mr. Robinson expressed his incredulity at the presence of any toxic agent, but this bold skeptic was crushed by the President, assisted by Mr. Howie and Mr. Martindale.

In the *Pharm. Zeitschr. für Russland*, 1890, E. Hirschsohn states that the active principle is neither a volatile oil nor an acid resin; this statement is neutralized by F. Schlagdenhauffen in an article in the *Pharm. Zeitung*, 1892, in which he states that he found the toxic properties to be (a) yellow volatile oil, and (b) uncrystallizable soft resinous mass, pyrethrotoxic acid very soluble in ether. It seems to me that the average buyer of insect powder, after careful consideration of the foregoing evidence by so many able men, would remain more or less doubtful as to the properties and characteristics for which he ought to look in deciding upon the value of the various qualities to be found in the insect powders of commerce. The results of my own work on this part of the subject may be briefly stated as follows:

The toxic properties are due to—

(a) A volatile oil amounting to 0.5 per cent. in picked specimens of closed flowers, and much less in open flowers.

(b) A soft acid resinous body, this is the principal source of the toxic effect. It is found to the amount of 4.8 per cent. in selected closed flowers, less than 4 per cent. in half open flowers, and still less in flowers that are fully open; the whole plant, apart from the flowers, contains mere traces of resin.

The fine dry powder, after exhaustion with ether, has no decided toxic properties, but numerous experiments on beetles convince me that this exceedingly fine powder contributes something to the insecticidal properties by its physical action, perhaps by its effect on respiration, reducing the vitality of the insect, and also by impeding locomotion, and preventing a speedy retreat from noxious surroundings, and a safe return to the customary lodgings. The toxic properties of the volatile oil and resin may be proved by isolating them and mixing them with an inert powder, whose physically deterrent equation has been ascertained by experiment on beetles. I believe no vivisection license is required for this.

Having referred to the toxic constituents of, and the proportions in which they exist in, genuine powder of the flowers of *C. cinerariæ*—

folium, it is very important to mention the fact that chlorophyll, in its green unchanged form, is not found in selected dried, closed insect flowers, as this fact has an important bearing on one (and I think the most prevalent) form of sophistication to be found in the present insect powders of commerce. I cannot fully explain why it is that insect powder from half-open, and from flowers that are fully developed, should show a certain amount of chlorophyll coloring in the ether extract, but it may possibly be that less care is taken in collection of these than is the case with the more valuable closed flowers. But whatever may be the cause, the fact remains that insect powder ground from selected closed flowers is sensibly free from chlorophyll, whereas traces of it (less than 0.5 per cent.) will be found in powders prepared from mixed and half-open flowers, and in the foreign-ground insect powders it often amounts to from 50 to 80 per cent. of the total ether extract. Samples have been recently examined by me yielding 6 per cent. of ether extract, of which more than two-thirds was owing to chlorophyll. It will therefore be seen that any estimate of the value of insect powder based upon the percentage of ether extract would be quite fallacious unless the chlorophyll be also determined and deducted from the total. Microscopical examination is useful in distinguishing the grosser forms of admixture, such as powdered quassia and the woody tissue of the leaves and stems of the plant, but this latter form of sophistication can be determined by the method given further on. [For full particulars of the microscopical appearance of true insect flowers, the reader is referred to the paper by Mr. William Kirkby, F.R.M.S. (*Proc. Brit. Pharm. Conf.*, 1888).]

Adulterants.—In using the term adulterants as applied to our subject, it is intended to imply the presence in insect powder of anything but the flowers of *C. cinerariæfolium*. Adulterators of insect powder have for their first object the cheapening of the article sold, and occasionally they have a second object, *i. e.*, to improve its color.

The first object has been achieved in the past by the addition of powder of quassia, aloes, senna and Hungarian daisy, and the artistic eye of the ignorant buyer has been satisfied by the addition of the powder of fustic, turmeric and chrome-yellow. The presence of quassia, fustic and turmeric may be detected by the aid of the microscope, and chrome-yellow (salt of lead) chemically. The presence of the powder of Hungarian daisy is more difficult to detect

microscopically, but it yields 10 per cent. of ash, whereas true insect powder yields but 6.5 per cent. On this point the reader is referred to an extract from a paper by J. Schrenk (AMERICAN JOURNAL OF PHARMACY, 1889) in the "Year Book," 1890.

It is hoped that it will not be difficult to accept my contention that by the term insect powder it is intended by both buyers and sellers that powder of the flowers of the *C. cinerariæfolium* is understood, at least so far as transactions in the open market are concerned. Owners of proprietary insect powders have a right to compound them as they please, and this right has been freely exercised by the use of powdered quassia, colocynth, etc., as well as by the addition of various coloring agents. Although powdered quassia mixed with powdered insect flowers must be considered to fall under our definition of adulteration, it is quite possible that a small proportion is useful in insect powder, increasing or broadening the base of its usefulness. The same remarks apply to other admixtures, such as powdered bitter apple, and the only criticism to be made on this point is that if powdered quassia or other powders having insecticidal properties be added to insect powder, let it be done with the knowledge of buyers and at the proper price.

The adulterants just referred to are for the most part things of the past, with the exception of added coloring matters, which are still very commonly used to meet the too general want of knowledge of the proper appearance of true insect powder. At the present time the insect powders of commerce may be divided into the following classes:

(1) Ground from closed (*a*) wild, or (*b*) cultivated flowers of *C. cinerariæfolium*.

(2) Ground from half-open or mixed half-open and open flowers.

(3) Ground from damaged flowers.

(4) Foreign-ground, divided into grades of badness under the meaningless terms: "closed flowers," "half-open flowers," etc., etc. Of these sorts there appears to be as many as there are of hens' eggs, which embrace all the kinds between "new-laid" at the top of the list, and "political" at the bottom. The English-ground insect powders do not always justify the description given, but in my experience, the foreign-ground specimens never do, and it is with much satisfaction that it is noted that a ready method of distinguishing "foreign-ground" is to hand.

It will be seen from the remarks made on the toxic constituents of the flowers of *C. cinerariæfolium* that the following statement embraces the results of my own experience as well as that of the majority of laborers in the same field:

That the value of insect powder is in direct proportion to the combined amount of essential oil and soft acid resin, and in inverse proportion to the amount of chlorophyll, both statements to be read together.

It has not been my good fortune, up to the time of writing this, to have met with one sample of "foreign-ground" insect powder that was not grossly sophisticated.

A perfect sample of insect powder should pass a sieve having at least eighty meshes to the linear inch; the particles would be, therefore, approximately $\frac{1}{160}$ of an inch in greatest magnitude. (The powder has been passed through a sieve with 100 meshes to a linear inch, but 90 is the more usual number.) The powder should yield 5.25 per cent. of combined essential oil and soft resin; chlorophyll should be absent, or present in the merest trace.

The following simple method of testing the value of insect powder should be adopted by all chemists who wish to sell a genuine powder, or, to put the matter on lower grounds, who wish to increase their sale of this really important commercial product. Place 100 grains of the powder to be tested in the cylinder of a glass syringe (1 oz.). The powder should be pressed down compactly on to a piece of absorbent cotton, to act as a filter. Moisten with ether 7.35. Close the top of the syringe, and macerate for thirty minutes; percolation may then proceed; the powder being re-percolated with the same fluid four times, and finally washed through with sufficient ether to make up one fluid ounce. The resulting percolate should be of a rich yellow color; if a pronounced green color be the result, the sample may be discarded at once.

In the absence of much green coloring matter, the fluid may be carefully evaporated (temperature not exceeding 200° F.), and the residue weighed in a tared watch-glass. The resulting soft mass should not weigh less than 3.75 grains, and in the finest samples reaches 5.5 grains, and should have the pleasant and characteristic odor of the flowers.³ At the present time the price of insect powder

³ Exactness may require the determination of the chlorophyll. If an appreciable amount be present, this may be done by boiling the residue in dilute sul-

varies between 8*d.*, and 2*s.* 2*d.* per lb., the highest price representing the value of English-ground powder from closed flowers and the lowest powder "foreign-ground" from the whole plant. This ground whole plant appears to be the principal sophistication, apart from the coloring matter, found in commerce at the present time.

I desire to acknowledge my indebtedness to Mr. Charles Umney for very fine specimens of the dry flowers of *C. cinerariæfolium*.

THE LIQUEFACTION OF FLUORINE.¹

BY H. MOISSAN AND J. DEWAR.

The physical properties of a large number of mineral and organic compounds of fluorine indicated, theoretically, that the liquefaction of fluorine could only be accomplished at a very low temperature. Whilst the chlorides of boron and silicon are liquid at ordinary temperatures, the fluorides are gaseous, and very far from their points of liquefaction. This is also true with the organic compounds; chloride of ethyl boils at + 12° C., and the fluoride of ethyl at 32°.² Chloride of propyl boils at + 45°, and the fluoride of propyl at — 2°.³

Similar observations have been made by Paterno and Oliveri,⁴ and by Vallach and Heusler.⁵

phuric acid and volumetrically determining the converted chlorophyll as glucose with a suitable copper solution. For my own purposes I should unhesitatingly reject the sample rather than take this unnecessary trouble, unless a fee were attached to the operation.

¹ M. Moissan brought all his apparatus for the production of fluorine to the Royal Institution on the occasion of his lecture there on Friday, the 28th of May. The next day the writer had the good fortune to witness in the laboratories of the Institution, by M. Moissan and Professor Dewar, some of the experiments which resulted in the liquefaction of fluorine. These experiments mainly owed their success to the unrivalled appliances for the production of intense cold possessed by the Institution, and the skill and experience of Professor Dewar and his assistants in preparing a special apparatus suitable for the examination of, and experimenting with, fluid fluorine, and in the manipulation of large quantities of liquid air.—W. C.

² H. Maissan, "Propriétés et Préparation du Fluorure d'ethyle," *Ann. de Chim. et de Phys.*, Series 6, Vol. XIX, p. 266.

³ Meslans, *Comptes Rendus*, Vol. CVIII, p. 352.

⁴ Paterno and Oliveri, "Sur les trois Acides Fluobenzoïques Isomères, et sur les Acides Fluotoluidique et Fluoisque," *Gazetta Chimica Italiana*, Vol. XII, p. 85, and Vol. XIII, p. 583.

⁵ Vallach and Heusler, *Annales de Liebig*, Vol. CCXLIII, p. 219.

Gladstone's experiments on atomic refraction⁶ can well be compared with these facts.

In fact fluorine by certain of its properties resembles oxygen, though at the same time it is distinctly at the head of the chlorine group.

The conclusion to be drawn from these observations appears to be that fluorine can only be liquefied with great difficulty. One of us showed that at a temperature of -95° , at the ordinary pressure, there is no change at all.⁷

In the new experiments which we now publish, fluorine was prepared by the electrolysis of fluoride of potassium in solution in anhydrous hydrofluoric acid. The fluorine gas was freed from vapors of hydrofluoric acid, by being passed through a serpentine of platinum, cooled by a mixture of solid carbonic acid and alcohol. Two platinum tubes filled with perfectly dry fluoride of sodium completed the purification.

The apparatus used for liquefying this gas consisted of a small cylinder of thin glass, to the upper part of which was fused a platinum tube. This latter contained in its axis another smaller tube, likewise of platinum. The gas to be liquefied enters by the annular space, passes through the glass envelope, and escapes through the smaller inner tube. This apparatus was fused to the tube by which the fluorine was supplied.

In these experiments we used liquid oxygen as the refrigerant. It was prepared according to the method already described by one of us, and this research, we may remark, required several litres.⁸

The apparatus being cooled down to the temperature of quietly boiling liquid oxygen (183°), the current of fluorine gas passed through the glass envelope without becoming liquid. But at this low temperature it has lost its chemical activity, and no longer attacks the glass.

If we now make a vacuum over the oxygen, we see, as soon as rapid ebullition takes place, a liquid collecting in the glass envelope,

⁶ J. H. Gladstone and G. Gladstone, "Refraction and Dispersion of Fluobenzene and Allied Compounds," *Phil. Mag.*, Series 5, Vol. XXXI, p. 1.

⁷ H. Moissan, "Nouvelles Recherches sur le Fluor," *Ann. de Chim. et de Phys.*, Series 6, Vol. XXIV, p. 224.

⁸ J. Dewar, "New Researches on Liquid Air," Royal Institution of Great Britain, 1896, and *Proc. Roy. Inst.*, 1893.

while gas no longer escapes from the apparatus. At this moment we stop with the finger the tube by which the gas had been escaping, so as to prevent air from entering, and the glass bulb soon becomes full of a clear yellow liquid, possessed of great mobility; the color of this liquid is the same as that of fluorine gas when examined in a stratum one metre thick. According to this experiment, fluorine becomes liquid at -185° .

As soon as this little apparatus is removed from the liquid oxygen the temperature rises, and the yellow liquid begins to boil with an abundant disengagement of gas, having all the energetic reactions of fluorine.

We took advantage of these experiments to study some of the reactions of fluorine on bodies kept at extremely low temperatures.

Silicon, boron, carbon, sulphur, phosphorus, and reduced iron cooled in liquid oxygen and then placed in an atmosphere of fluorine, did not become incandescent. At this low temperature fluorine did not displace iodine from iodides. However, its chemical energy is still sufficiently great to decompose benzine and essence of turpentine with incandescence as soon as their temperatures rose to -180° . It would thus seem that the powerful affinity of fluorine for hydrogen is the last to disappear.

There is still another experiment we ought to mention. When we pass a current of fluorine gas through liquid oxygen, a flocculent precipitate of a white color, which quickly settles to the bottom, is rapidly formed. If we shake up this mixture and throw it on a filter, we separate the precipitate, which possesses the curious property of deflagrating with violence as soon as the temperature rises.

We intend to follow up the study of this body, as well as that of the liquefaction and solidification of fluorine, which demand further experiments.—*Comptes Rendus*, Vol. CXXIV, No. 22, p 1202, through *Chemical News*, June 11, 1897.

RECENT LITERATURE RELATING TO PHARMACY.

A REACTION FOR DISTINGUISHING α -NAPHTOL FROM β -NAPHTOL.

E. Leger (*Jour. de Pharm. et de Chim.*, [6], 5, 527), distinguishes α naphthol and β -naphthol by adding to saturated aqueous solutions of each a solution of sodium hypobromite. The solutions of naphthol are prepared by rubbing the respective compounds in a mortar with

water, since by simply shaking in a test tube the naphthol frequently does not become moistened. The solution of sodium hypobromite is made by adding 30 c.c. of soda solution, 36° B. to 100 c.c. of water, and adding 5 c.c. of bromine.

To make the test, one takes of either naphthol solution 10 c.c., to which are added two drops of the sodium hypobromite solution.

(1) With the α -naphthol the reagent produces a violet color and precipitate. This reaction is so delicate that if the solution of α -naphthol is diluted with nine volumes of water the color is readily distinguished.

(2) The solution of β -naphthol is turned yellow by the reagent, then greenish and finally back to yellow.

It will be seen that this test is only applicable in a mixture of the two to a detection of α -naphthol. That fact, however, does not lessen its value materially in this country, where it is chiefly desired to prove the freedom of β -naphthol from the α -variety.

ASH OF PINEAPPLE.

J. J. Bowrey (*Bulletin of the Botanical Department, Jamaica*, 3, 236), gives the following composition of the ash of the pineapple, and draws conclusions concerning its cultivation:

	Per Cent.
Potash, K_2O	49'42
Potassium chloride, KCl	0'88
Sodium chloride, $NaCl$	17'01
Magnesia, MgO	8'80
Lime, CaO	12'15
Phosphoric acid, P_2O_5	4'08
Sulphuric acid, H_2SO_4	trace
Silica, SiO_2	4'02
Ferric phosphate	2'93
	<hr/>
	99'29

Judging from this analysis, potash is the most important mineral substance which the pineapple requires. Of course, phosphoric acid is also necessary, and so are lime, magnesia and iron; but it must be a very rare soil which does not contain iron and magnesia in ample quantity, and usually there is enough lime also present. It is difficult to make suggestions respecting manuring in total ignorance of the nature of the soil to be manured. But certainly no harm can be done and probably much good by adding phosphoric

acid and potash to the soil, the former is best applied as "basic slag" or "Thomas slag;" 5 to 10 cwt. per acre will supply phosphoric acid for three to four years. The potash can be obtained as chloride for about £8 per ton. From 50 to 100 pounds per acre would be a dressing for a year. The pineapple also needs nitrogen for its growth, this might be supplied as nitrate of soda, at £10 per ton, giving 100 pounds per acre when the plants have started to grow rapidly.

COLLECTING JUICE OF PAPAW.

F. B. Kilmer, in *Bulletin of the Botanical Department, Jamaica*, 4, 68, describes the method to be followed in collecting the juice from the fruit of *Carica papaya* in the Island of Jamaica. Cut an incision lengthwise of the fruit, not over $\frac{1}{8}$ of an inch in depth; if it is made much deeper the milk is apt to be carried into the fruit and not run outside. The milk will run quite freely for a short time, but soon coagulates so that it will no longer run. To catch the milk that drops and flows I place under the tree tin pans made in such a way as surround the trunk of the tree and catch the dripping milk.

I found it well to tap the fruit early in the morning, before the sun was very high, as it quickly dried the milk and stopped the flow. After the flow had ceased it was found to be a good practice to brush off all the coagulated milk into the pans and make a fresh incision, when another, but smaller, yield was obtained. The scorings should be made about $\frac{1}{2}$ inch apart all around the fruit. The time to tap the fruit is before it is ripe, and when it is green and full. The yield is much larger just after a rain storm or a spell of wet weather. Still, you can tap a green fruit at any time and obtain more or less of the white milk. This milk must be dried the same day that it comes from the tree, and *must* be dried in the sun. Artificial heat will not do. It can be dried right away on the tin pans, spread out thin, or spread out on sheets of glass. It will dry in an hour or so in the sun. Any amount of exposure to the sun will not harm it in drying, but artificial heat destroys it. If it should so happen in gathering that, owing to stormy weather, it cannot be dried in the sun the day it is gathered, you can mix it with some naphtha or benzine, turning it into a sort of milk.

CUTCH EXTRACTION.

When commercial cutch enters the domain of pharmacy it becomes catechu; but whether cutch or catechu, it is a substance of rather uncertain origin and of very variable composition. The following, from the *Indian Pharmacologist*, 2, 7, January 1, 1897, indicates that there is still much to be learned about this substance. "One of the most recent issues of the *Agricultural Ledger* series contains a brief account of the examination of a sample of Burma cutch received by a Glasgow firm through Dr. Watt. It is interesting if only for the fact that it brings out strongly the divergence that sometimes exists between chemical analysis and commercial opinion. Dr. Watt suggested that cutch should be manufactured in India by the superior European method of extracting dyes from timber. Twenty tons of the *Acacia Catechu* timber were procured here and shipped to Glasgow. Dr. Watt saw the timber before it was shipped and considered it to be of average quality. The timber was treated by the vacuum process, and the resulting product was described by Dr. Watt as a cutch of great purity and very good appearance. A chemical analysis by Dr. Leather showed that the cutch thus produced contained 6.58 per cent. of crude catechin and 78.20 per cent. of catechu tannin. At the same time a sample was submitted to the Calcutta Chamber of Commerce for professional opinion, and this was completely opposed to the conclusion of the chemist. Commercial opinion described it as 'very inferior to that imported from Rangoon.' The sample was described as overboiled, and would fetch only Rs. 3 a maund as against Rs. 8 for the best brands of Burma cutch. Clearly the commercial expert who reported on the sample made a mistake in his identification of it, for he reported that it was shipped to the Calcutta market in 2-ounce tins for mixing with paints, 'and in this form it has a special value, but for medicinal purposes, or for bazaar use, that is, for mixing with *pan*, it has no sale.'

"Dr. Watt, in a brief note on this curious divergence of opinion, says that the only explanation is that trade opinions are based mainly upon external appearances. The sample is unlike the ordinary article met with in the market, and probably bears some resemblance to an inferior grade known to dealers. 'As a general rule, the commercial expert is lost if carried out of the field of comparative valuations. He knows little or nothing of chemistry.' That

is true, of course, but the trade opinion shows that catch prepared by the vacuum process, though pronounced by chemical examination to be of great purity and good appearance, will not, for the present at least, secure anything like a good price in the market."

THE ALKALOIDS OF VERATRUM.

George B. Frankforter, in *Minnesota Botannical Studies*, Bulletin No. 9, May 31, 1897, gives an elaborate review of the veratrums, but especially mentions *V. viride*, which is the only one occurring in Minnesota. Its general range in North America, under the popular name of Hellebore, is a broad one.

The substance commonly known in pharmacy as veratrine, varies widely in its composition, chemical, physical and physiological properties. The introduction of the so-called "Merck veratrine" has changed matters somewhat, although samples of the Merck alkaloid have been found to vary considerably in their general properties. One of the chief causes of this exceptional variation is the extreme difficulty with which the alkaloid crystallizes, thus almost excluding the most important means of purification. Another, and perhaps the most important reason for this wide variation, lies in the fact that almost every one of the early investigators of the "veratria" has given the name to a different alkaloid, or to a mixture of alkaloids.

The foregoing introduction is followed by a concise history, beginning in 1819 with the work of Pelletier and Caventou on *Veratrum sabadilla* and following it step by step down to Salzberger, who in 1890 made an exhaustive examination of *Veratrum album*.

Then follows the "experimental part" in which the author operated on a sample of crystallized veratrine which was of a light gray color, and appeared, when highly magnified, in imperfect granular crystals. It was slightly soluble in water, very soluble in methyl, ethyl and amyl alcohols, and in ether, acetone, chloroform and carbon disulphide. Its melting point after repurifying was 146 to 148° C., and its identity with that described by Merck and Ahrens was established by elementary analysis, as well as by the melting point of the gold double salt. The formula was made out to be $C_{32}H_{49}NO_9H_2O$.

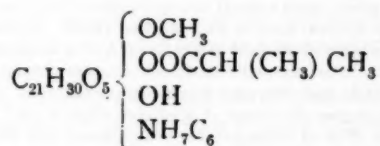
The following iodine compounds were prepared and studied :

- Veratrine tetraiodide, $C_{32}H_{49}NO_9I_4 \cdot 3H_2O$
 " triiodide, $C_{32}H_{49}NO_9I_3$
 " monoiodide, $C_{32}H_{49}NO_9I$

Other compounds were prepared and investigated as follows :

- Chloralhydroveratride, $C Cl_3 CH (OC_{32}H_{49}NO_9)_2$
 Veratrine methyl iodide, $C_{32}H_{49}NO_9CH_3I$.
 " methylhydroxide, $C_{32}H_{49}NO_9CH_3OH$.
 " methylhydroxyhydrochloride, $C_{32}H_{49}NO_9CH_3OH \cdot HCl$.
 " ethylbromide, $C_{32}H_{49}NO_9C_2H_5Br$.
 " allyliodide, $C_{32}H_{49}NO_9C_3H_5I$.

The author concludes with the statement that the structural formula of veratrine is still a mystery. From the odor of picoline by a destructive distillation, and the isolation of β Picoline by Ahrens, it is evident that veratrine is a pyridine derivative, resembling in many respects nicotine. Whether both cevadic and tiglic acids are present, remains for future experiments to determine. The work of Schmidt and Köppen indicates the presence of both acids, while the careful researches of Wright and Luff would indicate that these isomeric acids are converted into each other by special reagents. Assuming that but one acid is present, the following formula may be assigned to veratrine :



Experiments at present are being conducted along this line, with the hope of throwing more light on the structure of this important compound.

EDITORIAL.

THE AMERICAN MEDICAL ASSOCIATION.

The Jubilee Meeting of this Association, held in Philadelphia, June 1 to 4, inclusive, was a notable one in many respects. Not only was the attendance of 2,500 members unusual, but the deluge of papers presented in the various sections attested the industry of the members during the past year. The founder of the Association, Dr. N. S. Davis, of Chicago, and one of the first secretaries, Dr. Alfred Stillé, of Philadelphia, were both present at the meeting. The former delivered an address entitled : " A Brief History of the Origin of the

American Medical Association." This address is not only very interesting, but it is a document of considerable historical value, for Dr. Davis is almost the only one who can speak with authority on this subject. He first briefly outlined the early history of the country, and called attention to the fact that, springing as it did from a few States, which had achieved independence, the Government was confronted with many difficult problems, the one of education by no means being the least; but it was decided to leave that important subject to the regulation of individual States.

Our educational history as an independent people commenced thus, during the last half of the last quarter of the eighteenth century, in a new and sparsely populated country, extending from Maine to Florida, with only four medical schools organized, all as departments of literary colleges or universities, and all attracting annually attendance of less than 300 students, of whom not more than fifteen annually received the degree of Doctor of Medicine, and no two of them controlled by the laws of the same State. And it must be noted, also, that a very large majority of those who entered upon the practice of medicine at that time gained their education in the office of some established practitioner, and were licensed by the censors of medical societies, the judges of courts, or even by the certificates of their preceptor, without ever having spent a day in a medical college.

After thus outlining the early history, the speaker came to the years 1846-47, when the Association was organized, when it was found that colleges had multiplied until thirty were in existence, with an annual attendance of 3,500 students, of whom not less than 1,000 received the degree of Doctor of Medicine. This rapid increase in the number of colleges necessarily led to the most active rivalry.

So potential was the question: "In which school can I obtain the degree of Doctor of Medicine for the least expenditure of time and money?" on the several medical schools, that, although the three medical schools originally organized in Philadelphia, New York and Boston had been founded on the same basis or curriculum as the University of Edinburgh, requiring a good academic education as a preliminary for entering the medical course, then from three to five years of medical study, with annual college terms of not less than six months, long before the number of our medical schools had reached thirty, all preliminary requirements had been abandoned, the term of medical study limited to a nominal three years, and the medical college instruction to two annual repetitional courses of from twelve to sixteen weeks each. Under this inadequate and unsystematic medical education it really cost less in time and money to obtain the degree of Doctor of Medicine than it had previously cost to serve an apprenticeship in the office of a respectable practitioner, and obtain a license from the censors of a local medical society.

Such a deplorable condition naturally led to a desire on the part of many for reform, which, it was said, could only be effected by organization. As early as 1835 the faculty of the Medical College of Georgia urged, through the medical press and by correspondence, the holding of a National Convention. This and several other attempts failed, until, in 1846, Dr. Davis and a few associates effected organization in New York, and arranged for meeting in Philadelphia in May, 1847.

The speaker then detailed the business of the first meeting, named the officers of that meeting, and concluded as follows:

Such is a brief history of the *origin, objects and organization* of the American Medical Association, which, with the exception of the first two years of the great war for the preservation of the Union of these States, has held its regular annual meetings in all the important parts of our widely-extending country, still adhering tenaciously to the fundamental principles on which it was founded. And I am most happy to add that every leading object sought to be accomplished by its founders has been substantially obtained; that is, universal, free and friendly, social and professional intercourse has been established; the advancement of

medical science and literature in all their relations has been promoted, and the long agitated subject of medical education has reached the solid basis of a fair academic education as a preparatory, four years of medical study, attendance on four annual courses of graded medical college instruction of from six to nine months each, and licenses to practice to be granted only by State Boards of Medical Examiners.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

THE STANDARD MANUAL OF SODA AND OTHER BEVERAGES. By A. Emil Hiss, Ph.G. G. P. Engelhard & Co., Chicago. 1897.

Quite recently we reviewed in this JOURNAL, *The Standard Formulary*, in which the author of the present work was associated in joint authorship with Mr. A. E. Ebert. The Standard Manual is, therefore, a fitting companion to its predecessor.

Chapter I is devoted to historical considerations, and is a compact statement of the growth of the enormous industry in which "soda water" is the foundation.

The second chapter is made up of such general directions as making carbonated water, discharging the generator, and all the other manipulations connected with making and dispensing beverages. The remainder of the book, amounting to nine-tenths, is devoted to formulas, in which nearly every conceivable, and some inconceivable, "soda water" beverages receive attention. "In the soda water drinks, all spirituous preparations have been omitted, except in certain well-known standard articles, and in the formulas received from special contributors."

FLOWERS OF FIELD, HILL AND SWAMP. By Caroline A. Creevy, author of *Recreations in Botany*. The foregoing is the title of a book recently published by Harper & Brothers, New York.

It is a botanical work, intended to instruct persons who have no technical knowledge of botany in the art of classifying and naming many of our common Eastern flowering plants.

Such works, when properly presented, are of great benefit. They appeal to persons who are interested in flowers, but who are deterred from taking up the study of botany on account of the dreaded "technical names" which in such cases are administered in a palatable form.

It is a matter of great regret that a book indicating such a large amount of painstaking work on the part of the author, and representing such a high degree of typographical skill, should be marred by so many inaccuracies in the illustrations which accompany the descriptions of many of the plants.

Written descriptions are often ambiguous because of their great latitude; but in illustrating a plant it should be remembered that the persons receiving instruction are apt to look upon a cut as an absolute likeness of the plant, whereas, in many cases, a dozen illustrations would be necessary to give an idea of the variety of forms assumed by a single species under varying conditions.

In the present work some of the cuts are not of typical forms, but of abnormal species, being probably taken from a single herbarium specimen in many instances. The illustrations of spearmint, on page 19, and bugleweed, on page 71, might be transposed to advantage, as neither is correct, while an interchange would be an improvement upon accuracy.

The frontispiece shows *Hepatica triloba*, or liverleaf, in a most luxuriant state, with numerous flowers and fully-developed leaves at the same time; the early spring leaf-buds, which invariably accompany the typical specimen, being entirely absent, while the previous year's leaves, which in nature are usually flat on the earth and covered up, are erect and flourishing in appearance.

Oxalis corniculata, var. *stricta*, yellow-wood sorrel, as seen on page 182, is a midsummer form of the plant, very different from that commonly observed and almost unrecognizable.

Lysimachia quadrifolia, four-leaved loosestrife, page 337, is another illustration very misleading in its character. Instances multiply rapidly, but the following are all liable to similar criticism: *Hypericum perforatum*, St. Johnswort, page 237; *Campanula rotundifolia*, harebell, page 291; *Apocynum androsaemifolium*, dogbane, page 521, and *Linaria canadensis*, blue toad-flax, page 421.

The work contains descriptions of a very large number of plants, the arrangement being upon a novel basis, and one of doubtful advantage, *i. e.*, the character of the habitat, such as "banks of streams, in swamps, in water, in low meadows, along waysides and in dry fields, escaped from gardens, weeds, open dry woods, deep cool woods, etc."

In nature no boundaries exist that will allow of certain classification of plants in general in this manner, and it is to be feared that the person who attempts to classify plants by this book will not care to go further into the science.

CHARLES H. LA WALL.

NOTES ON THE PLANTS USED BY THE KLAMATH INDIANS OF OREGON. By Frederick V. Coville. Contributions from the U. S. National Herbarium, Vol. 5, No. 2. Issued June 9, 1897.

While engaged in a botanical survey of the plains of southeastern Oregon, in the summer of 1896, the author spent three days, August 21st to 23d, at Fort Klamath and the Klamath Indian Agency, where he was enabled to secure information as to the principal plants used by the Klamath Indians. Most of the information was obtained from Joe Kirk, an educated Klamath Indian, and from White Cindy, a Klamath medicine woman. The Government agents living at the fort also furnished much information. A large number of plants, covering nearly the whole range of natural orders are given. Two lichens are represented; one, *Alectoria fremontii*, as a famine food; and the other, *Evernia vulpina*, on account of its yellow dye. *Equisetum hyemale* is used to smooth arrow shafts just as a carpenter uses sand-paper. A number of the Pinaceæ are used for various purposes. The seeds of *Pinus Lambertiana* are used as food, but no mention is made of the sugar, which is used as food or medicine by the California Indians. Some of the pines are used as twirling sticks, to produce fire by friction, although the sage brush, *Artemisia tridentata*, is said to be better for this purpose. These illustrations will serve to give an idea of the scope of this work, which, however, is only a pamphlet of 32 pages. Nevertheless, it is full of valuable information.

MINNESOTA BOTANICAL STUDIES. Bulletin No. 9, Parts X and XI. Geological and Natural History Survey of Minnesota. Conway MacMillan, State Botanist.

This large bulletin of 342 pages and 42 plates is full of interesting matter relating to botany.

The following are the contents :

"Contributions to a Knowledge of the Lichens of Minnesota." II. "Lichens of Minneapolis and Vicinity." By Bruce Fink.

"A Rearrangement of the North American Hypomycetes." By Roscoe Pound and Frederic E. Clements.

"On Some Mosses at High Altitudes." By J. M. Holzinger.

"The Forces Determining the Position of Dorsiventral Leaves." By R. N. Day.

"On the Genus *Coscinodon* in Minnesota." By J. M. Holzinger.

"Observations on the Ferns and Flowering Plants of the Hawaiian Islands." By A. A. Heller.

"The Phenomena of Symbiosis." By Albert Schneider.

"Observations on the Distribution of Plants Along the Shore at Lake of the Woods." By Conway MacMillan.

"The Alkaloids of *Veratrum*." By George B. Frankforter.

The last article is given in abstract on page 372 of this JOURNAL.

A SERIES OF PAPERS ON THE ORIGIN AND CHEMICAL COMPOSITION OF PETROLEUM. Read before the American Philosophical Society, February 5, 1897.

This interesting series has been reprinted from the Proceedings of the Society, and bound together, so as to make a compact pamphlet for reference. The following are the subjects and authors :

"The Genesis and Chemical Relations of Petroleum and Natural Gas." By Samuel P. Sadtler, Ph.D.

"On the Nature and Origin of Petroleum." By S. F. Peckham.

"A Suggestion as to the Origin of Pennsylvania Petroleum." By David T. Day.

"On the Genesis of Natural Gas and Petroleum." By Francis C. Phillips.

"On the Occurrence of Petroleum in the Cavities of Fossils." By Francis C. Phillips.

"On the Composition of American Petroleum." By Charles F. Mabery.

The discussion which followed the reading of these papers is also included in the pamphlet.

A REVIEW OF RECENT SYNTHETIC WORK IN THE CLASS OF CARBOHYDRATES. By Helen Abbott Michael.

This is a lecture delivered before the Franklin Institute, and reprinted from the Institute's *Journal*. It is a valuable summary of the present knowledge of the sugar group.

SUR LE DOSAGE DE LA CAFEINE. Thesis presented to the *École Supérieure de Pharmacie de Paris*. By Eugene Tassilly. The author has examined some of the methods already proposed, and offered one which he thinks possesses the advantages of all the earlier processes, and, at the same time, avoids their disadvantages. A summary of the literature on the subject is given from 1872 to the present.

QUELQUES OXYDES DOUBLES CRISTALLISÉS OBTENUS A HAUTE TEMPÉRA-

TURE. Thesis presented to the *École Supérieure de Pharmacie de Paris*. By M. Dufau (Louis-Émile-René).

BULLETIN. Vol. II, No. 7. *Imperial University, College of Agriculture, Tokyo, Japan*.

This number, like its predecessors, is full of valuable matter relating chiefly to physiological botany. The first article is a continuation by Dr. Loew, of the study of living protoplasm. We have also received one of the articles, as a separate, "On the Formation of Asparagine in Plants under Different Conditions." By U. Suzuki. *Bulletin*, Vol. III, No. 1, has also been received. Its 113 pages are devoted entirely to an exhaustive consideration by Professor Dr. Diro Kitao, to the one subject—"Ueber die Wasserbewegung in Böden."

PAPAIN; the vegetable pepsin, its origin, properties, and uses. Lehn & Fink, New York.

ANTITOXINS. The G. F. Harvey Company. An illustrated pamphlet, giving much historical matter and considerable clinical data on the use of this important remedy.

THE ACTION OF TAKA-DIASTASE IN VARIOUS GASTRIC DISORDERS. By Julius Friedenwald, A.B., M.D. Reprinted from the *New York Medical Journal*, for May 29, 1897.

REPORT OF PROCEEDINGS OF THE ILLINOIS PHARMACEUTICAL ASSOCIATION. Seventeenth Annual Meeting, 1896.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The twentieth annual meeting of the Pennsylvania Pharmaceutical Association convened in the parlor of the Kittatinny House, Delaware Water Gap, Pennsylvania, on Tuesday, June 22, 1897.

The first session was called to order by President Joseph P. Remington, at 4.48 P.M. About seventy-five persons were present. The Secretary was asked to read a letter of welcome, which had been received from the chief burgess of the borough of the Delaware Water Gap, Mr. E. R. Johnson. The President asked Mr. M. N. Kline to reply to this courtesy. The routine of business was then begun by the Secretary acknowledging the receipt of the credentials of delegates from the following bodies: Philadelphia College of Pharmacy, National Wholesale Druggists' Association, New Jersey Pharmaceutical Association, Maryland Pharmaceutical Association and the Proprietors' Association. The President then delivered his address. It was referred to a committee for consideration.

The reports of the Committee on Entertainment and of the Secretary were then presented; they were referred to the Committee on Publication. The report of the Treasurer showed a comfortable balance, and that the association had at the time of the report 312 members in good standing. It was referred to an auditing committee appointed by the chair. The report of the Executive Committee stated that the project of holding a joint meeting of the Pennsylvania and Maryland Pharmaceutical Associations had met with favor. The chairman of this committee reported two applications for membership which had

been made since the last meeting, also seven deaths among members. The report was referred to the Committee on Publication. The President then appointed committees on nominations and place of next meeting. It was then voted to adjourn until 9.30 the following morning.

The second session, which met on Wednesday morning, was mainly occupied by the reading of reports of committees and of delegates to pharmaceutical and medical associations. The following officers were elected for the ensuing year: President, J. H. Redsecker; Vice-Presidents, J. H. Knouse and W. L. Cliffe; Treasurer, J. L. Lemberger; Secretary, J. A. Miller; Executive Committee, G. W. Roland, C. L. Hay and W. F. Horn. The Committee on Adulteration reported that they had been successful in securing a new law against this practice. Under the old law it was difficult to conduct prosecutions, owing to the wording of the Act; in the new law this was thought to have been overcome. The committee reported that comparatively few adulterations had presented themselves during the past year. Attention was directed to the fact that if pharmacists insist upon jobbers supplying goods which meet the standards of the United States Pharmacopœia and the National Formulary, without regard to brands, they will get them, and without additional cost. President Remington advised the Association, when it undertook a prosecution, to select some article upon which it would undoubtedly win the case, and not one upon which the Association might be liable to defeat by the lawyers proving that the impurity or adulteration was as good for the purpose as the article said to be adulterated. He cited the contamination of carbolic acid with cresylic acid as an illustration of an impurity which was of equal or greater value as a disinfectant than the substance with which it was mixed.

The next report was that of the Committee on Botany. It was chiefly confined to an enumeration of plants and trees of that part of Pennsylvania east of the Susquehanna River. The committee suggested the adoption, as far as possible, of the proper scientific names for plants, as their meanings are usually sufficiently specific to distinguish one plant from its congeners. The report directed the attention of pharmacists to the deforestation of our immense natural woodlands and the changes in meteorological and climatic conditions which follow the destruction of forests. It suggested that an effort be made to mitigate the evil by enacting and enforcing suitable laws.

The principle issue of the report of the committee to attend the National Wholesale Druggists' Association, was a question as to the legitimacy of pharmacists buying *phenacetine* through other channels than the authorized agents, who charge much more for what is represented to be the same article and sold for less by the unauthorized dealers. This feature of the report elicited considerable discussion, and it was made apparent that the Association objected to the protection which the present copyright laws give to manufacturers who try to sell a well-defined and well-known chemical under a fancy name. To overcome this state of affairs, F. W. E. Stedem moved that the Association secure the co-operation of the American Pharmaceutical Association and the American Medical Association in an effort to have the copyright laws of the United States on definite chemical compounds revised. It was stated that the Pennsylvania State Medical Society has pledged itself to co-operate with the American Medical Association for the repeal of such copyright laws.

The committee on time and place of meeting, announced that the next annual

meeting will be held at Buena Vista Hotel, Franklin County, Pa. The time will be reported later, as it will be a joint meeting with the Maryland Pharmaceutical Association, which will convene in its own State, just across the Mason and Dixon line. F. B. Flemmings, of Shippensburg, was appointed local secretary. The delegates to the State Medical Society reported that samples of about 2,000 preparations had been exhibited before the meeting of this body in Pittsburgh. It was evident that this committee, of which Prof. Louis Emanuel was chairman, had done a great work toward attracting the attention of the members of the foregoing society to the preparations of the United States Pharmacopœia and the National Formulary. Prof. Emanuel proposed that a committee be appointed to consider the feasibility of establishing a literary bureau from which printed matter on National Formulary and other preparations might be drawn for distribution among physicians, for the purpose of combating the advertisements of copyrighted articles. This, and the other consideration of copyrighted articles, were referred to a committee composed of Messrs. Stedem, George, Emanuel, Redsecker and Kennedy. During the discussion which followed the last report, F. W. E. Stedem proposed a mixture of the spirit of orange of the National Formulary, and glycerin in equal quantities, as a vehicle for bromoform; its advantages are pleasant taste and solvent power on the medicament. Prof. Emanuel moved that Prof. Beal's idéal pharmacy law, which was distributed among the State associations and boards of pharmacy, by the American Pharmaceutical Association, be referred to the Committee on Legislation. It was so ordered. The auditing committee approved the treasurer's report. The presentation of papers then followed.

"The Flora of Bushkill Falls" was the title of a paper read by Adolph W. Miller, M.D., Ph.D. This contribution was an account of a botanizing tour made by the Philadelphia Botanical Club and the Torrey Botanical Club, of New York, through the district of Bushkill, Pike County, Pa., on May 28th last. Dr. Miller was one of the party which explored this rich region. He called particular attention to the following plants: the American yew, the gold thread, *Rhododendron maximum*, *R. nudiflorum*, *R. canescens*, *Kalmia latifolia*, *K. angustifolia*, *Vaccinium stamineum*, *Cypripedium hirsutum* (formerly called *C. pubescens*), *Orchis spectabilis*, *Cystopteris bulbifera*, *Camptosorus rhizophyllus*, *Osmunda struthiopteris*, many forms of the Napoleon flower, and *Scrophularia leporella* (recently separated from *S. nodosa* by Bicknell).

Attention was also called to the abundance, in the neighborhood of the *Taraxacum erythrosperma*, Andr., which, until quite recently, was included in the official species, the *Taraxacum officinale*, although it was described as early as 1821, by Anton Andrzejowski, whose name is attached to it. It differs in many particulars from the official plant, notably in the color of its achenes, which are crimson, bright red or reddish-brown, whence it received the title "*erythrosperma*." Its pappus is slightly tawny, or dirty white in color; its leaves are far more deeply divided into narrowly triangular segments, and the whole plant is rather smaller in size than the *Taraxacum officinale*. While a head of the latter may be made up of 160 to 170 individual florets, one of the red seeded species does not contain more than 70 to 80. The head itself is smaller, being scarcely an inch in diameter, and the fruiting receptacle is rarely more than one-quarter inch broad. There seems to be also a slight difference in the color of the head, that of the *Taraxacum erythrosperma* being rather more of a sul-

phur or lemon-yellow color than the other. The inner bracts of the involucre are nearly all furnished with a peculiar corniculate appendage, half a line or so below the whitish tip, and the outer ligules of the head are somewhat purplish on the external surface. A specimen of the *T. erythrosperma* presents a much more matted, or interlaced appearance in its growth than the taller species. As the *T. officinale* 'Weber' is undoubtedly an introduced plant from Europe, it is just possible that the *T. erythrosperma* is a native of America. Appended to the paper was a list of 275 plants, most of which were found in bloom. The next paper was "On the Presence of Corrosive Sublimate in Calomel," by Lyman F. Kebler. It is printed in full on page 338 of this issue.

In reply to the query: *Should drug store experience in pharmaceutical education precede or follow college training?* Theodore Campbell presented a paper in which he earnestly urged every druggist to see that his clerks have not less than one year of experience in the store before attending lectures at a college of pharmacy. The author showed that a clerk who has had such experience will be better prepared to receive the college instruction, and that drug store training previous to attendance at college qualifies a person to open a store and conduct the business in all its phases immediately after graduation from a college.

William B. Thompson contributed a paper entitled "A Pertinent Query," which was, in effect, a presentation and discussion of the question as to whether the practice of pharmacy may rightly be regarded as a profession. His arguments were convincing, and left little doubt that he who fills the various requirements of this calling is justly entitled to a professional standing.

Another paper by Mr. Thompson was on the subject of "Chlorinated Lime in Zinc Containers." In this he stated that the method of packing chlorinated lime in cans made of sheet zinc had been employed a sufficient length of time to thoroughly test its merits. He observed that the article stored in this manner preserved its condition unimpaired for a reasonable period.

Wm. McIntire suggested that the package be labelled with the date of packing and the strength of the substance at that time.

The query: *should druggists study medicine?* was answered in the affirmative by W. H. Reed. The ethical relations of the professions of pharmacy and medicine as such, and as they were formerly practiced, were first defined by the author. He then considered the complications of the two classes as they now exist, and favored the adoption by druggists of measures adapted to the changed conditions brought about by modern business innovations.

He said that druggists were protected by legal enactments only in the dispensing of poisons and compounding of prescriptions; and he believed that not more than one-fourth of the present drug stores could subsist on this kind of patronage alone. He also said that the average drug store now without the aid of a physician is not a success financially. He, therefore, recommended the practice of medicine in connection with that of pharmacy, under certain conditions, both as a means of success and to meet the demands of certain classes of patrons, namely, those affected with disorders of a transient nature, and those with limited means.

The writer furthermore believed that where he is legally qualified, the druggist is as morally justified in practicing medicine in connection with pharmacy as the physician is justified in supplying his patients with drugs, and thereby injuring the business interests of the pharmacist.

Another reason which he advanced for druggists studying medicine, even though they did not intend to practice it, was that a medical training would be of inestimable value to them in the practice of general pharmacy.

Under the head of "Rocks and Shoals of Pharmacy," Prof. C. B. Lowe presented some common-sense doctrine, which was particularly intended for young men beginning the drug business. Of the hindrances to success in this business, he considered the following: Immorality, insufficient capital, extravagance in fitting up the store, purchase of large quantities of stock ahead of the demand, or purchase of stock on account of its cheapness, too early marriage, insufficient education, lack of business methods with regard to the workings of the store, carelessness in financial details, want of politeness, neglect of health, neglect of certain kinds of advertising, and finally, lack of pharmaceutical literature.

"Cold Cream" was the subject of a paper by F. W. E. Stedem.

It was as follows: "Since the last revision of the United States Pharmacopœia, many complaints have been made by physicians as to the deterioration of ointments of metallic oxides and other medicinal substances, when made with unguentum aquae rosae as the unction vehicle. The cause of these rapid changes is due to admixture of a small per cent. of borax, which has been added because of its saponifying the oil of almond partially, and thereby holding the rose water in suspension all the more readily. My experience with both formulas has led me to the firm conviction that the change to the use of borax was a very unwise one, for many reasons. The first objection is illustrated in a series of ointments of various mercurials in daily use, and the results are, on inspection, obvious. These preparations were made on May 10, 1897, a little over a month ago, and in all cases one would be unable to recognize the mixtures. The preparation of ointment of yellow oxide of mercury is particularly objectionable, and its unsightliness is not the least of its failings. This ointment is frequently ordered by physicians for use on the eye, and when made with official cold cream, is totally unfit for use, because of the terribly irritating properties of the reduction product. It is not the desire of the writer to prolong the line because of its length, beyond submitting these specimens, including an ointment of yellow oxide of mercury, a dilution of ointment of nitrate of mercury, and an ointment of red oxide of mercury. It is a question as to whether the change from the Pharmacopœia of 1880 was not made in deference to a demand from those who are simply unwilling to work hard in an effort to get a good or fit preparation. There is no difficulty in making a good and sightly mixture by the old process when worked right and long enough. It would be much better to drop the preparation entirely from the Pharmacopœia than to continue it and make it necessary for us to keep both preparations in stock, for the reasons given before."

This paper was commented on at length; other members reported trouble from the same source, and also dissatisfaction with the changes which had been made in some other official preparations. Prof. Moerk mentioned the discoloration which happens when resorcin or hydroquinone is mixed with official cold cream or other substances which contain alkaline bodies. The paper was referred to the Association's committee on the revision of the United States Pharmacopœia.

Prof. F. X. Moerk then read an interesting contribution entitled "Notes on Opium Assaying; see page 244 of this number.

"Analytical Processes and Laboratory Notes," by C. H. LaWall followed. This paper may be seen in full by referring to page 350.

The Committee on Membership reported thirteen new members. The Secretary read a telegram bearing fraternal greeting from the Colorado Pharmaceutical Association, which was in session at the time. He returned the courtesy on behalf of the Pennsylvania Association.

The Committee on Legislation reported that the pharmacy law known as an act to regulate the practice of pharmacy, sale of poisons, etc., approved May 24, 1887, and subsequently amended in June, 1891 and June, 1895, upon being tested as to its efficiency to meet the requirements and purposes for which it had been enacted, failed to withstand the crucial test of the courts. The first section was declared unconstitutional by the Superior Court on January 29, 1897, on account of the so-called unlimited widow's clause, which decision, on an appeal, was sustained by the Supreme Court on May 7, 1897. The committee at once began work to secure the speedy enactment of a new law, which would be free from the objections that had brought such disastrous results to the former law. With this object in view, a bill was introduced in the House on March 1, 1897, and one of like import was introduced in the Senate on March 15, 1897. This latter bill passed second reading in the Senate. The House bill met with a formidable resistance, and was amended in such manner as to require compulsory registration of physicians as pharmacists without the semblance even of an examination by the pharmacy board. This provision met with a determined opposition, and its advocates were notified that the pharmacists of the State would never accept legislation of that character, but would demand and insist upon the enactment of such legislation as would place them on a parity with the laws governing the medical profession. Some 12,000 to 15,000 circulars and reprints of bills, including petitions to be signed and forwarded to the members of the Senate and House, were mailed to the druggists throughout the State, with the gratifying effect of arousing an almost united sentiment in favor of the original measure and against the proposed amendment; and the committee had the satisfaction of the prompt passage by the House of the bill without the objectionable amendment. The bill was next passed by the Senate, but with a further slight amendment, which the committee feels sure will be accepted and promptly concurred in by the House. The following is a copy of the bill:

An act supplementary to an act entitled An act to regulate the practice of pharmacy and sale of poisons and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania, approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven, further regulating the practice of pharmacy, the compounding and dispensing of prescriptions and the sale of drugs, chemicals, medicines and poisons, and providing a penalty for the violation thereof.

SECTION 1.—Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the same, That hereafter no person whosoever shall, directly or indirectly, open or carry on in the State of Pennsylvania any retail drug store or chemical store, or compound or dispense medicines or prescriptions of physicians, or engage in the business of selling at retail any drugs, chemicals, poisons or medicines without having obtained a certificate of competency and qualification so to do from the State Pharmaceutical Examining Board, and without having been duly

registered by said board. Any person who shall violate or fail to comply with the provisions of this section shall be guilty of a misdemeanor, and on conviction before any court shall be punished by a fine not exceeding one hundred dollars; Provided, however, that nothing in this act contained shall in any manner whatever be taken or construed to prohibit any practitioner of medicine from supplying to his patients such articles as he may deem proper, nor to interfere with the making and dealing in proprietary medicines, nor to prevent storekeepers from dealing in and selling the commonly used medicines and poisons as now permitted by the sixth section of the act to which this is a supplement. And provided, also, that the legal representatives of any deceased registered pharmacist may, for the purpose of administration of his estate, be permitted by the Orphans' Court of the proper county to continue the business for not exceeding one year under the management of a duly registered pharmacist.

SECTION 2.—The term commonly used medicines and poisons relating to storekeepers is defined as simple and harmless household remedies which can be handled with safety by the uneducated, as essence of ginger, peppermint, Hoffman's anodyne, castor oil, sweet oil and drugs of like character, and to exclude all dangerous and highly concentrated remedies, alkaloids, fluid and solid extracts, and drugs, such as opium, morphine, cocaine, chloral hydrate and drugs of like character, and poisons in the same case to mean only such well known drugs and chemicals as are used by farmers and truckers as insecticides, as Paris green, royal purple, powdered hellebore, sulphate of copper and drugs of like character.

A bill already referred to in this report and known as the "Adulteration Bill," was signed by Governor Hastings on May 25th last. It is:

An act to prevent the adulteration, alteration and substitution of drugs and medicinal preparations; and providing penalties for violation thereof.

SECTION 1.—Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That no person shall within this State manufacture for sale, offer for sale or sell any drug which is adulterated within the meaning of this act. The term drug used herein shall include any medicinal substance or any preparation authorized or known in the *Pharmacopœia of the United States* or the *National Formulary* or the *American Homœopathic Pharmacopœia* or the *American Homœopathic Dispensatory*. A drug shall be deemed to be adulterated within the meaning of this act,

(1) If any substance or substances have been mixed with it so as to depreciate and weaken its strength, purity or quality.

(2) If any quality, substance or ingredient be abstracted so as to deteriorate or affect injuriously the quality or potency of the drug.

(3) If any inferior or cheaper substance or substances have been substituted in whole or part for it.

(4) If it is an imitation or is sold under the name of another drug.

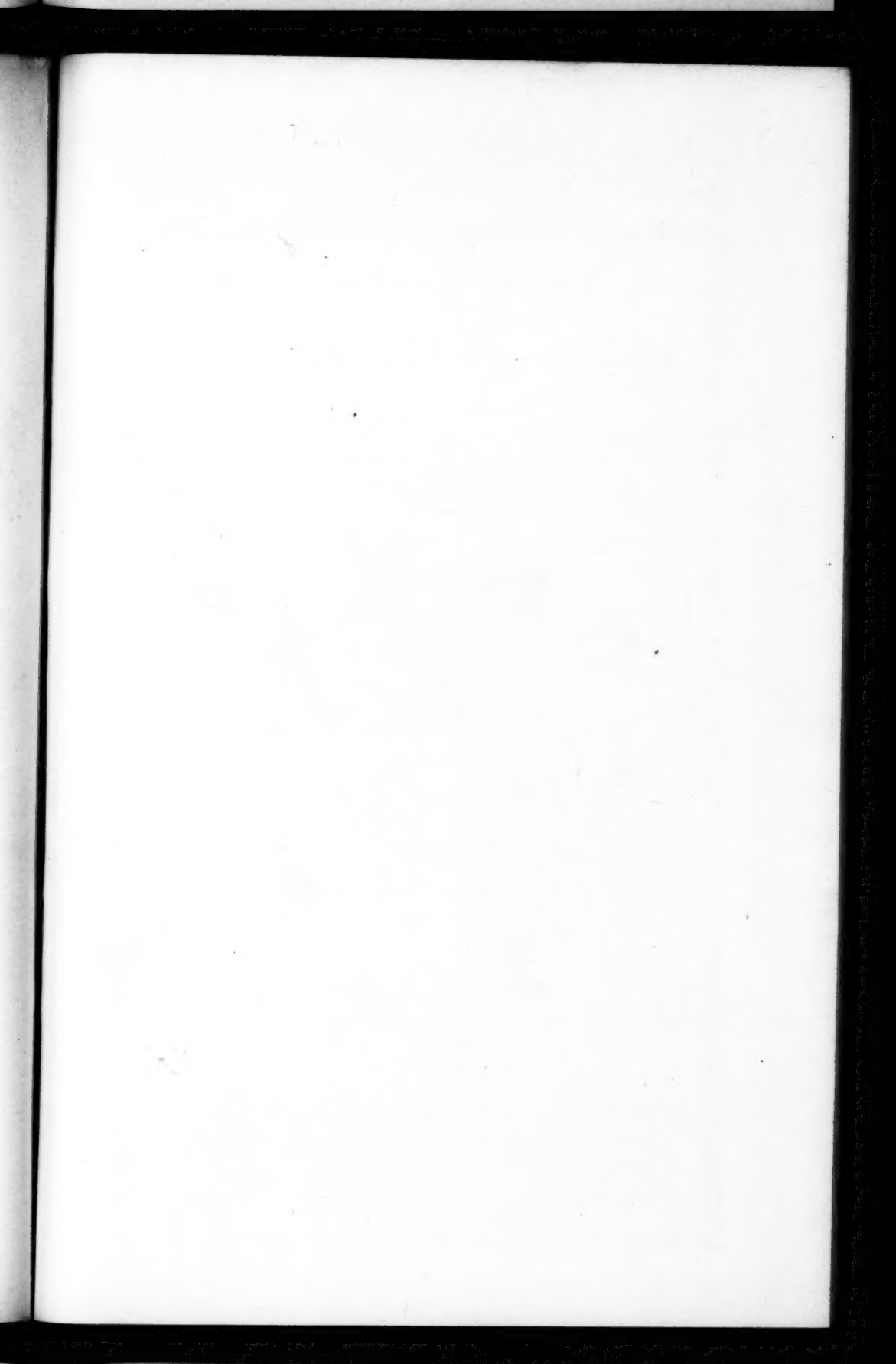
(5) If the drug shall be so altered that the nature, quality, substance, commercial value or medicinal value of it will not correspond to the recognized formulæ or tests of the latest edition of the *National Formulary* or of the *Pharmacopœia of the United States* or the *American Homœopathic Pharmacopœia* or the *American Homœopathic Dispensatory* regarding quality or purity.

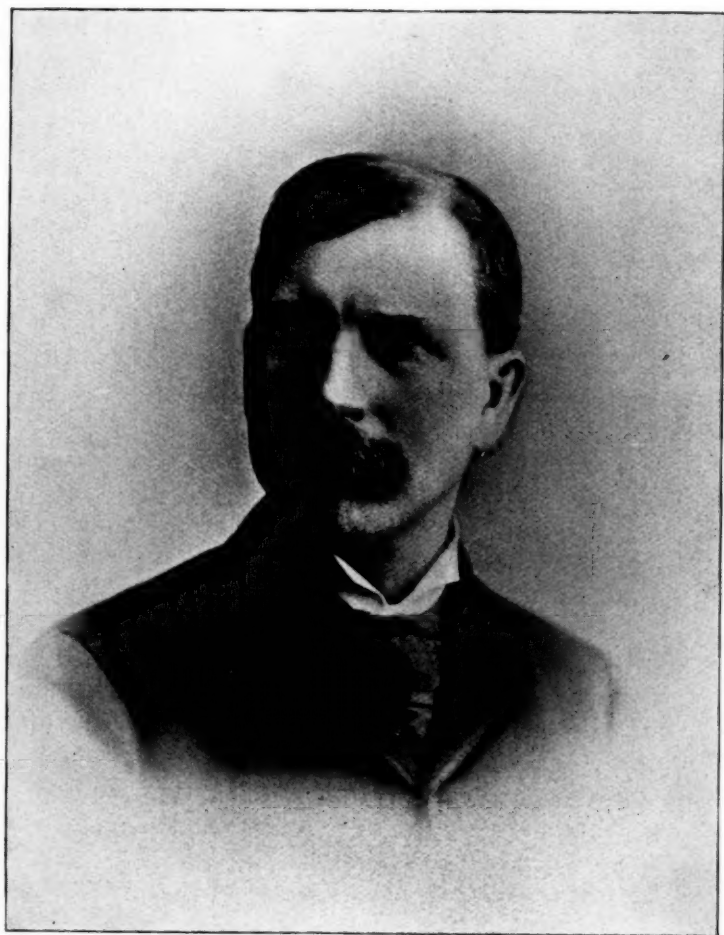
On complaint being entered the State Pharmaceutical Examining Board is hereby empowered to employ an analyst or chemical expert, whose duty it shall be to examine into the so-called adulteration and report upon the result of his investigation, and if said report justifies such action, the board shall duly cause the prosecution of the offender as provided in this law. Whoever violates any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction shall be fined a sum not exceeding one hundred dollars nor less than fifty dollars, or undergo an imprisonment not exceeding ninety days nor less than thirty days, or both.

SECTION 2.—All laws or parts of inconsistent laws herewith are hereby repealed.

A vote of thanks was extended to the Committee on Legislation and to the members of the Legislature who had worked for and supported the measures.

The officers for the coming year were installed at the last session, on Thursday evening. The entertainment provided for the meeting by the committee in charge was of an interesting character, well attended and much enjoyed by all present.





Edison S. Bastin.